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February 10, 2021

VIA E-MAIL

Mr. Joseph E. Cole
Associate General Counsel
Office of the General Counsel
U.S. Environmental Protection Agency
William Jefferson Clinton Building (North)
Mail Code 2310A
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460
Cole.JosephE@epa.gov

Re: Petition to Cancel RM Glufosinate-Ammonium Technical

The Agricultural Handler Exposure Task Force, LLC (AHETF or the Task Force) hereby petitions the United States Environmental Protection Agency (EPA or the Agency) to cancel the RM Glufosinate-Ammonium Technical (Technical) registration (EPA Reg. No. 84840-3) held originally by Ragan and Massey, Inc. (EPA Reg. No. 84009-34) and transferred to Ragan and Massey Inc.'s affiliate Tangi-Pac, LLC (Ragan and Massey, Inc. and Tangi-Pac, LLC each or together referred to as RM), and to deny or cancel any glufosinate applications or registrations that rely on that registration. AHETF brings this Petition under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), 7 U.S.C. §§ 136-136y, as amended, EPA's FIFRA regulations, including 40 C.F.R. Part 152, the Petition Clause of the First Amendment, and the Administrative Procedure Act (APA), 5 U.S.C. § 555(b).

AHETF has submitted substantial data, which assess the potential risk associated with pesticide exposures experienced by agricultural workers and others who handle and apply pesticide products in various use "scenarios." RM applied for and obtained its RM Glufosinate-Ammonium Technical product, using the selective method of citation, and failed to cite AHETF data or provide AHETF with an offer-to-pay letter, despite RM's registration containing use scenarios dependent on the Task Force's data. As detailed below, AHETF submits this petition to cancel because RM has failed to comply with its obligation to compensate data owners for reliance on their studies in support of a registration. *See generally* 7 U.S.C. § 136a(c)(2).

EPA's attention to this petition is critical to protecting FIFRA's data compensation scheme by ensuring that RM (and future follow-on applicants) do not undermine the rights of

FIFRA Task Forces and other data owners like AHETF. Absent a complete and unqualified offer to pay from RM, EPA must cancel RM's registration.

I. BACKGROUND

A. History of AHETF

AHETF is a task force comprised of 27 pesticide companies, which was originally formed in 2001 to generate data required by EPA to assess the occupational risks associated with a wide-range of agricultural pesticide handler activities.[1] Prior to AHETF's formation, EPA relied exclusively on the Pesticide Handler Exposure Database (PHED) to support assessments of handler exposure to pesticides. In consultation with EPA, Health Canada, and the California Department of Pesticide Regulation, AHETF completed the design and development of the new agricultural handler exposure database to replace PHED. EPA has confirmed that AHETF data are the "most reliable" at addressing handler exposure issues for a wide-variety of scenarios and EPA routinely relies on AHETF data in making registration decisions.[2] EPA has replaced PHED data with AHETF data for a large number of scenarios in its Occupational Pesticide Handler Unit Exposure Surrogate Reference Table ("Surrogate Reference Table").[3]

B. RM Glufosinate-Ammonium Technical Registration

RM applied for its RM Glufosinate-Ammonium Technical registration using the selective citation method on January 30, 2019, obtained the registration on February 11, 2020, and received approval of the transfer of the registration to its affiliate on March 12, 2020. *See* Exhibits A (RM Glufosinate-Ammonium Technical Product Label) and B (RM Glufosinate-Ammonium Technical Data Matrix). In support of that registration, RM submitted a table identifying the data it claims to have cited in support of its application and noting those studies, which it claims it has offered to pay compensation. *See* Exhibit B. RM's table does not include AHETF data.

Glufosinate is a broad spectrum herbicide that is registered for use on a wide range of crops, grasses, and ornamentals, and is applied through a variety of use scenarios. The RM Glufosinate-Ammonium Technical registration allows it to be formulated into a herbicide for: "weed control of emerged weeds in noncrop areas, control of weeds and grasses in residential

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[1] *See* EPA Pesticide Registration Notice 2007-3: The Agricultural Handlers Exposure Task Force, LLC, https://www.epa.gov/pesticide-registration/prn-2007-3-agricultural-handlers-exposure-task-force-llc.

[2] *See*, *e.g.*, https://www.epa.gov/pesticide-science-and-assessing-pesticide-risks/occupational-pesticide-handler-exposure-data#ahetf.

[3] https://www.epa.gov/pesticide-science-and-assessing-pesticide-risks/exposure-surrogate-reference-table-pesticide-risk.

and industrial areas," in addition to any, "uses for which the U.S. EPA has accepted the required data and/or citations of data that the formulator has submitted in support of registration and uses for experimental purposes that are in compliance with U.S. EPA requirements." *See* Exhibit A.

RM's data matrix falls far short of the data required to support the registration – notably it cites only PHED for the occupational exposure data requirements, and not any AHETF data. EPA must therefore cancel RM's registration unless RM generates and submits its own data, or alternatively provides a valid offer to pay to AHETF that cites the omitted studies identified in Exhibit C (List of AHETF Compensable Data on Which RM Relies).

C. RM Must Submit or Cite All Data Required to Support Its Registration

A fundamental requirement of FIFRA is that each application for registration must be supported by cited or submitted data sufficient to satisfy the no "unreasonable adverse effects" standard that governs every registration. FIFRA §§ 3(c)(1)(F), 3(c)(5). A follow-on applicant may cite, and EPA may rely upon, data submitted by another registrant within the preceding 15 years "*only if* the applicant has made an offer to compensate the original data submitter. . . ." FIFRA § 3(c)(1)(F)(iii) (emphasis added); *see also* 40 C.F.R. § 152.93(b)(3) (a follow-on applicant may cite another company's study without compensation only if "the study was originally submitted to the Agency on or before the date that is 15 years before the date of the application for which it is cited. . .").

The protection of the original data submitter's rights is so fundamental under FIFRA that "if [EPA] determines that an applicant for registration of a product has acted in any way that deprives an original data submitter of rights under FIFRA section 3(c)(1)(F), the Agency *will take steps* to deny the application or cancel the registration, as appropriate." 40 C.F.R. § 152.99(c)(3) (emphasis added). As EPA confirmed when it adopted the original implementing regulations in 1984, EPA "rel[ies] heavily on data submitters to monitor compliance" with the data-citation requirements under FIFRA and to submit petitions where insufficient data have been cited to support an application.[4] To that end, the regulations provide data owners up to one year from the date the registration is granted to file petitions to cancel based on a follow-on's failure to submit or cite required data. 40 C.F.R. §152.99(b)(1). In response to such petitions, EPA must ensure that a complete offer to pay has been made which identifies each applicable data requirement and cites all the data necessary to satisfy each requirement and to demonstrate no unreasonable adverse effects. *See* 40 C.F.R. §§ 152.90, 152.93(b)(2)(ii).

[4] EPA, Pesticide Programs; Pesticide Registration and Classification Procedures; Application Procedures to Ensure Protection of Data Submitters' Rights, 49 Fed. Reg. 30884, 30899 (Aug. 1, 1984); 40 C.F.R. § 152.99(b).

D. Data Required for Registration

The data required to support a given registration depends on the characteristics of the pesticide active ingredient and the uses included in the registration. The starting point is 40 C.F.R. Part 158, which sets forth "the minimum data and information EPA typically requires to support an application for pesticide registration. . . ." 40 C.F.R. § 158.1(b)(1). Part 158 indicates whether certain studies are typically required or conditionally required to support registration, based on the proposed uses of the pesticide product. Data identified as "conditionally required" under Part 158 become "required" when conditions set forth in the test notes are satisfied. *See, e.g.*, 40 C.F.R. § 158.630(e) (test notes for conditionally required ecotoxicology data). EPA can and frequently does require additional data beyond the studies identified in Part 158 to support registration of a given pesticide product. 40 C.F.R. § 158.30(a); *see also id.* § 158.1, § 158.130(a).

All of the AHETF data are of a single type – human exposure data – which are required pursuant to 40 C.F.R. Part 158, Subpart K if certain toxicity and exposure criteria are met. RM already acknowledged that this type of data is required for its registration by including the applicator exposure requirements in 40 C.F.R. § 158.1020 in its data matrix. *See* Exhibit B at 8-9 (including guidelines 875.1100 through 875.1700).

E. AHETF's Right to File this Petition

AHETF brings this petition because RM chose to use the selective citation process but failed to make the required offer-to-pay associated with the data necessary to support its registration. As the data owner, AHETF's only recourse under the regulations is to file this petition asking EPA to cancel RM's registration. *See* 40 C.F.R. § 152.99(a)(2).[5]

II. ARGUMENT

The RM Glufosinate-Ammonium Technical registration and all registrations reliant upon it must be canceled because RM has not offered to compensate AHETF for the data required to support a glufosinate technical registration. Specifically, RM failed to offer to pay for 35 occupational exposure studies, which are necessary to support the registration under the standard described above. A failure to cancel RM's registration will endanger both AHETF's data rights and the delicate balance created by FIFRA's data compensation schemes. Under EPA's regulations, if an applicant fails to submit an offer to pay at all (as RM did here), or even if they

[5] Additionally, AHETF is also entitled to petition EPA as an "interested person" under the Administrative Procedure Act, and EPA has acknowledged its obligation to consider petitions to cancel pursuant to the Petition Clause of the First Amendment to the United States Constitution. *See* 5 U.S.C. § 555(b); *Block v. Sec. & Exch. Comm'n*, 50 F.3d 1078, 1085 (D.C. Cir. 1995) (noting that Section 555(b) of the APA "is universally understood to establish the right of an interested person to participate in an on-going agency proceeding").

submit a deficient offer, EPA may not grant an application or allow a granted registration to continue. *See* 40 C.F.R. §§ 152.112, 152.113(a)(3), 152.114(c). Rather, EPA has just one available course of action to protect a data owner's rights — "the Agency will take steps to deny the application or cancel the registration, as appropriate." 40 C.F.R. § 152.99(c)(3).

A. RM Failed to Cite Studies Required by EPA to Support Labeled Uses

AHETF exposure data addresses various occupational handler exposure scenarios, which are combinations of mixing, loading and/or application of pesticide products. To determine what AHETF scenarios the RM Glufosinate-Ammonium Technical registration implicates, it is helpful to reference an example end-use product formulated from RM Glufosinate-Ammonium Technical. For example, the product label for RM Glufosinate, one of RM's end-use glufosinate products, implicates the following occupational exposure scenarios based on its use instructions:

- Mixing/loading of liquids in support of aerial, groundboom, and spot/directed spray applications;
- Application aerially;
- Application with ground boom equipment;
- Mixing/loading/application with mechanically pressurized handgun sprayers; and
- Mixing/loading/application with backpack sprayers.

See Exhibit D (RM Glufosinate Product Label). Within the body of occupational handler exposure data developed in consultation with the EPA and submitted to the EPA by AHETF, 35 studies relate to these five exposure scenarios, which are set forth in Exhibit C.

At the time of RM's application, EPA had incorporated AHETF data for these occupational exposure scenarios within the Surrogate Reference Table. *See* Exhibit E (Occupational Pesticide Handler Unit Exposure Surrogate Reference Table, June 2018). Despite this, RM did not cite any AHETF data in its data matrix, or provide AHETF with an offer to pay.

In its data matrix dated January 30, 2019, RM erroneously relies exclusively on PHED data for the occupational exposure data requirements noting, "PHED data were used to determine Short/Intermediate Term Agricultural Handler Exposure and Risk Estimates for Glufosinate Ammonium (Spot/Directed Spray Applications) in the Human Health RA," with Human Health RA most likely referring to the January 24, 2013 Glufosinate Ammonium Human Health Risk Assessment for Registration Review. In so doing, RM fails to acknowledge the additional applicable exposures for mixing, loading and aerial and groundboom applications. Moreover, this statement does not consider that EPA would have relied on the most recent version of the Surrogate Reference Table available at the time of RM's submission to assess occupational exposure, that being the June 2018 version and not the older and outdated September 2011

version that was referenced in the Registration Review Human Health Risk Assessment. Therefore, EPA should have required RM to cite AHETF data in support of its application.

AHETF respectfully requests that EPA issue a written ruling confirming that AHETF data as set forth in Exhibit C are required to support RM's registration without delay.

III. CONCLUSION

RM's failure to offer to pay for 35 studies necessary to satisfy applicable data requirements requires EPA to cancel the RM Glufosinate-Ammonium Technical registration. EPA should not allow RM to retain its registration unless RM promptly satisfies all of the applicable data requirements by citing and offering to pay AHETF, at a minimum, for the 35 required studies identified in Exhibit C to this Petition. These data are required to support the labeled use scenarios and EPA should, at this time, confirm that these data must be cited.

AHETF requests that if RM contends that any of the data identified as required in Exhibit C are not necessary to support the registration of RM Glufosinate-Ammonium Technical, RM should be required to provide its position and the factual and legal bases therefore in a formal opposition to this Petition, and that AHETF be provided an opportunity to submit a reply before EPA rules on this petition.

In filing this Petition, AHETF does not waive any of the rights available to it in any forum to seek further relief under FIFRA, the Administrative Procedure Act, or any other source of law.

Thank you for your consideration.

Respectfully submitted,

Mackenzie S. Schoonmaker
Counsel for AHETF

Enclosures

cc (via email):
Erin Koch and Michele Knorr, Office of General Counsel, U.S. Environmental Protection Agency (koch.erin@epa.gov) and (knorr.michele@epa.gov)
Marietta Echeverria, Acting Director, Registration Division, U.S. Environmental Protection Agency (echeverria.marietta@epa.gov)
Michael Massey, Ragan and Massey, Inc.
Janelle Kay, Pyxis Regulatory Consulting (Agent for RM)
David Johnson, AHETF Task Force Manager
Jeff Burkey, AHETF Data Compensation Consultant

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that on this 10th day of February, 2021, true and correct copies of the foregoing Petition to Cancel RM Glufosinate-Ammonium Technical was served upon the following by e-mail:

Mr. Joseph E. Cole
Associate General Counsel
Office of the General Counsel
U.S. Environmental Protection Agency
Cole.JosephE@epa.gov

Michael Massey
Owner
Ragan and Massey, Inc.
mikem@raganandmassey.com

Mackenzie S. Schoonmaker

Index of Exhibits
Submitted in Support of AHETF's Petition to Cancel
RM Glufosinate-Ammonium Technical

Exhibt A	RM Glufosinate-Ammonium Technical Product Label, dated February 11, 2020
Exhibit B	RM Glufosinate-Ammonium Technical Data Matrix, dated January 30, 2019
Exhibit C	List of AHETF Compensable Data on Which RM Relies
Exhibit D	RM Glufosinate Product Label, dated November 18, 2019
Exhibit E	Occupational Pesticide Handler Unit Exposure Surrogate Reference Table, dated June 2018

EXHIBIT A

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Pesticide Programs
Registration Division (7505P)
1200 Pennsylvania Ave., N.W.
Washington, D.C. 20460

NOTICE OF PESTICIDE:
_X_ Registration
___ Reregistration
(under FIFRA, as amended)

EPA Reg. Number:	**Date of Issuance:**
84009-34	2/11/20

Term of Issuance:
Unconditional

Name of Pesticide Product:
RM Glufosinate-Ammonium Technical

Name and Address of Registrant (include ZIP Code):

Ragan and Massey, Inc.
c/o Pyxis Regulatory Consulting Inc.
4110 136th St. Ct. NW
Gig Harbor, WA 98332

Note: Changes in labeling differing in substance from that accepted in connection with this registration must be submitted to and accepted by the Registration Division prior to use of the label in commerce. In any correspondence on this product always refer to the above EPA registration number.

On the basis of information furnished by the registrant, the above named pesticide is hereby registered under the Federal Insecticide, Fungicide and Rodenticide Act.

Registration is in no way to be construed as an endorsement or recommendation of this product by the Agency. In order to protect health and the environment, the Administrator, on his motion, may at any time suspend or cancel the registration of a pesticide in accordance with the Act. The acceptance of any name in connection with the registration of a product under this Act is not to be construed as giving the registrant a right to exclusive use of the name or to its use if it has been covered by others.

This product is unconditionally registered in accordance with FIFRA section 3(c)(5) provided that you:

1. Submit and/or cite all data required for registration/reregistration/registration review of your product when the Agency requires all registrants of similar products to submit such data.

2. Make the following label changes before you release the product for shipment:

    - Revise the EPA Registration Number to read, “EPA Reg. No. 84009-34.”

    Submit one copy of the revised final printed label for the record before you release the product for shipment.

Signature of Approving Official:	**Date:**
Erik Kraft, Product Manager 24 Fungicide Herbicide Branch, Registration Division (7505P)	2/11/20

EPA Form 8570-6

Should you wish to add/retain a reference to the company's website on your label, then please be aware that the website becomes labeling under the Federal Insecticide Fungicide and Rodenticide Act and is subject to review by the Agency. If the website is false or misleading, the product would be misbranded and unlawful to sell or distribute under FIFRA section 12(a)(1)(E). 40 CFR 156.10(a)(5) list examples of statements EPA may consider false or misleading. In addition, regardless of whether a website is referenced on your product's label, claims made on the website may not substantially differ from those claims approved through the registration process. Therefore, should the Agency find or if it is brought to our attention that a website contains false or misleading statements or claims substantially differing from the EPA approved registration, the website will be referred to the EPA's Office of Enforcement and Compliance.

If these conditions are not complied with, the registration will be subject to cancellation in accordance with FIFRA section 6. Your release for shipment of the product constitutes acceptance of these conditions. A stamped copy of the label is enclosed for your records. Please also note that the record for this product currently contains the following CSFs:

- Basic CSF dated 01/03/2019
- Alternate CSF 1 dated 01/03/2019
- Alternate CSF 2 dated 01/03/2019

If you have any questions, please contact BeWanda Alexander by phone at (703)347-0313, or via email at alexander.bewanda@epa.gov.

Enclosure

RM Glufosinate-Ammonium Technical

ACTIVE INGREDIENT:	**By Wt.**
Glufosinate-ammonium	95.1%
OTHER INGREDIENTS:	4.9%
TOTAL	100.0%

KEEP OUT OF REACH OF CHILDREN

CAUTION

FIRST AID	
If on skin or clothing:	• Take off contaminated clothing. • Rinse skin immediately with plenty of water for 15 to 20 minutes. • Call a poison control center or doctor for treatment advice.
If inhaled:	• Move person to fresh air. • If person is not breathing, call 911 or ambulance, then give artificial respiration, preferably mouth-to-mouth if possible. • Call a poison control center or doctor for further treatment advice.
If swallowed:	• Call a poison control center or doctor immediately for treatment advice. Have a person sip a glass of water if able to swallow. • Do not induce vomiting unless told to do so by a poison control center or doctor. • Do not give anything by mouth to an unconscious person.
If in eyes:	• Hold eye open and rinse slowly and gently with water for 15 to 20 minutes. • Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. • Call a poison control center or doctor for further treatment advice.
HOTLINE NUMBER Have the product container or label with you when calling a Poison Control Center or doctor, or when going for treatment. For non-emergency information concerning this product, call the National Pesticides Information Center (NPIC) at 1-800-858-7378, Monday through Friday, 8:00 AM to 12:00 PM Pacific Time (NPIC Web site: www.npic.orst.edu).	
NOTE TO PHYSICIAN: Glufosinate-ammonium is a glutamine synthetase inhibitor and can interfere with neurotransmitter function. Symptoms may be delayed by up to 48 hours following ingestion. There is no specific antidote. If ingested, endotracheal intubation and gastric lavage should be performed as soon as possible, followed by charcoal and sodium sulfate administration.	

For Chemical Spill, Leak, Fire, or Exposure, call CHEMTREC 1-800-424-9300

Manufactured for:
Ragan & Massey, Inc.
101 Ponchatoula Parkway
Ponchatoula, LA 70454

EPA Reg. No. 84009-
EPA Est. No.
Net Weight: lbs (kg)
Lot No.: See container

PRECAUTIONARY STATEMENTS
HAZARDS TO HUMANS AND DOMESTIC ANIMALS
CAUTION

Harmful if absorbed through skin. Harmful if inhaled. Harmful if swallowed. Causes moderate eye irritation. Avoid contact with eyes, skin or clothing. Avoid breathing dust. Wash thoroughly after handling and before eating, drinking, chewing gum, using tobacco or using the toilet. Remove contaminated clothing and wash clothing before reuse.

ENVIRONMENTAL HAZARDS

Do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans, or other waters unless in accordance with the requirements of a National Pollutant Discharge Elimination System (NPDES) permit and the permitting authority has been notified in writing prior to discharge. Do not discharge effluent containing this product to sewer systems without previously notifying the local sewage treatment plant authority. For guidance contact your State Water Board or Regional Office of the Environmental Protection Agency.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.
Do not use this product until you have read the entire label. This manufacturing-use product may be used only for formulation into a herbicide for: Weed control of emerged weeds in noncrop areas, control of weeds and grasses in residential and industrial areas, uses for which the U.S. EPA has accepted the required data and/or citations of data that the formulator has submitted in support of registration and uses for experimental purposes that are in compliance with U.S. EPA requirements. This product may be used to formulate products for specific use(s) not listed on this label if the formulator, user group, or grower has complied with U.S. EPA data submission requirements regarding the support of such use(s).

STORAGE AND DISPOSAL

Do not contaminate water, food or feed by storage, disposal or cleaning of equipment.
PESTICIDE STORAGE: Store in original container and keep closed. Store in a cool, dry place.
PESTICIDE DISPOSAL: Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.
CONTAINER HANDLING: Fiber Sacks including Flexible Intermediate Bulk Containers (FIBC) or Fiber Drums With Liners: Nonrefillable container. Do not reuse or refill this container. Completely empty fiber sack or drum liner by shaking and tapping sides and bottom to loosen clinging particles. Empty residue into application or manufacturing equipment. Then offer for recycling if available or dispose of empty fiber sack or fiber drum and liner in a sanitary landfill, or by incineration. Do not burn, unless allowed by state and local ordinances.

WARRANTY AND LIMITATION OF DAMAGES

Ragan and Massey, Inc. warrants that this product conforms to the chemical description on the label and is reasonably fit for the purposes set forth in the complete Directions For Use label booklet ("Directions") when used in accordance with those Directions under the conditions described therein. TO THE EXTENT CONSISTENT WITH APPLICABLE LAW, NO OTHER EXPRESS WARRANTY OR IMPLIED WARRANTY OF FITNESS FOR PARTICULAR PURPOSE OR MERCHANTABILITY IS MADE. This warranty is also subject to the conditions and limitations stated herein. Buyer and all users shall promptly notify this Company of any claims whether based in contract, negligence, strict liability, other tort or otherwise. Upon opening and using this product, buyer and all users are deemed to have accepted the terms of this Warranty and Limitation of Damages which may not be varied by any verbal or written agreement. If terms are not acceptable, return at once unopened.

[EPA approval date]

ACCEPTED
02/11/2020
Under the Federal Insecticide, Fungicide and Rodenticide Act as amended, for the pesticide registered under EPA Reg. No. 84009-34

EXHIBIT B

Form Approved OMB No. 2070-0060

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
401 M Street, S.W.
WASHINGTON, D.C. 20460

Paperwork Reduction Act Notice: The public reporting burden for this collection of information is estimated to average 0.25 hours per response for registration activities and 0.25 hours per response for reregistration and special review activities, including time for reading the instructions and completing the necessary forms. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden to: Director, OPPE Information Management Division (2137), U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, DC 20460. Do not send the form to this address.

DATA MATRIX

Date Jan. 30, 2019	EPA Reg No./File Symbol 84009-	Page 1 of 19
Applicant's/Registrant's Name & Address Ragan and Massey, Inc. 101 Ponchatoula Parkway Ponchatoula , LA 70454	Product RM Glufosinate-Ammonium Technical	

Ingredient: Glufosinate-ammonium (CAS No. 77182-82-2; Chemical Code: 128850)

Guideline Reference Number	Guideline Study Name	MRID Number	Submitter	Status	Note
PRODUCT SPECIFIC DATA REQUIREMENTS					
830.1550	Product identity and composition	50734401	Ragan and Massey, Inc.	OWN	
830.1600	Description of Materials Used to Produce the Product	50734401	Ragan and Massey, Inc.	OWN	
830.1620	Description of the Production Process	50734401	Ragan and Massey, Inc.	OWN	
830.1650	Description of the Formulation Process				Not applicable[1]
830.1670	Discussion of Formation of Impurities	50734401	Ragan and Massey, Inc.	OWN	
830.1700	Preliminary Analysis	50734402	Ragan and Massey, Inc.	OWN	
		50734403	Ragan and Massey, Inc.	OWN	
		50734404	Ragan and Massey, Inc.	OWN	
830.1750	Certified Limits	50734401	Ragan and Massey, Inc.	OWN	
830.1800	Enforcement Analytical Method	50734402	Ragan and Massey, Inc.	OWN	
		50734403	Ragan and Massey, Inc.	OWN	
		50734404	Ragan and Massey, Inc.	OWN	
830.6302	Color	50734405	Ragan and Massey, Inc.	OWN	
		50734415	Ragan and Massey, Inc.	OWN	
830.6303	Physical State	50734405	Ragan and Massey, Inc.	OWN	
		50734415	Ragan and Massey, Inc.	OWN	
830.6304	Odor	50734405	Ragan and Massey, Inc.	OWN	
		50734415	Ragan and Massey, Inc.	OWN	
830.6313	Stability to Normal and Elevated Temperatures, Metals and Metal Ions	50734415	Ragan and Massey, Inc.	OWN	
830.6314	Oxidation/Reduction: Chemical Incompatibility	50734408	Ragan and Massey, Inc.	OWN	

Signature	Name and Title	Date
	Ann M. Tillman, PhD | Agent	Jan. 30, 2019

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
401 M Street, S.W.
WASHINGTON, D.C. 20460

DATA MATRIX

Date Jan. 30, 2019	EPA Reg No./File Symbol 84009-	
Applicant's/Registrant's Name & Address Ragan and Massey, Inc. 101 Ponchatoula Parkway Ponchatoula , LA 70454	Product RM Glufosinate-Ammonium Technical	

Ingredient: Glufosinate-ammonium (CAS No. 77182-82-2; Chemical Code: 128850)

Guideline Reference Number	Guideline Study Name	MRID Number	Submitter	Status	Note
830.6315	Flammability	50734416	Ragan and Massey, Inc.	OWN	Waiver[2]
830.6316	Explodability	50734409	Ragan and Massey, Inc.	OWN	
830.6317	Storage Stability	50734416	Ragan and Massey, Inc.	OWN	PRN 92-5[3]
830.6319	Miscibility	50734416	Ragan and Massey, Inc.	OWN	Not applicable[4]
830.6320	Corrosion Characteristics	50734416	Ragan and Massey, Inc.	OWN	PRN 92-5[3]
830.6321	Dielectric Breakdown Voltage	50734416	Ragan and Massey, Inc.	OWN	Not required[5]
830.7000	pH	50734405 50734415	Ragan and Massey, Inc. Ragan and Massey, Inc.	OWN OWN	
830.7050	UV/Visible Absorption	50734405 50734415	Ragan and Massey, Inc. Ragan and Massey, Inc.	OWN OWN	
830.7100	Viscosity	50734416	Ragan and Massey, Inc.	OWN	Not applicable[6]
830.7200	Melting Point/Melting Range	50734405 50734415	Ragan and Massey, Inc. Ragan and Massey, Inc.	OWN OWN	
830.7220	Boiling Point/Boiling Range	50734416	Ragan and Massey, Inc.	OWN	Not applicable[7]
830.7300	Density/Relative Density/Bulk Density	50734405 50734415	Ragan and Massey, Inc. Ragan and Massey, Inc.	OWN OWN	
830.7370	Dissociation Constants in Water	50734413	Ragan and Massey, Inc.	OWN	
830.7520	Particle size, fiber length, and diameter distribution	50734416	Ragan and Massey, Inc.	OWN	Waiver[8]
830.7550	Partition Coefficient (n-octanol/water), Shake Flask Method	50734415	Ragan and Massey, Inc.	OWN	
830.7560	Partition Coefficient (n-octanol/water), Generator Method				See 830.7550

Signature	Name and Title	Date
	Ann M. Tillman, PhD | Agent	Jan. 30, 2019

Form Approved OMB No. 2070-0060

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
401 M Street, S.W.
WASHINGTON, D.C. 20460

DATA MATRIX

Date Jan. 30, 2019	EPA Reg No./File Symbol 84009-	Page 3 of 19
Applicant's/Registrant's Name & Address Ragan and Massey, Inc. 101 Ponchatoula Parkway Ponchatoula , LA 70454	Product RM Glufosinate-Ammonium Technical	

Ingredient: Glufosinate-ammonium (CAS No. 77182-82-2; Chemical Code: 128850)

Guideline Reference Number	Guideline Study Name	MRID Number	Submitter	Status	Note
830.7570	Partition Coefficient (n-octanol/water), Estimation by Liquid Chromatography				See 830.7550
830.7840	Water Solubility: Column Elution Method, Shake Flask Method	50734415	Ragan and Massey, Inc.	OWN	
830.7860	Water Solubility: Generator Column Method				See 830.7840
830.7950	Vapor Pressure	50734415	Ragan and Massey, Inc.	OWN	
870.1100	Acute oral toxicity – rat	00142430 00142431 00142432		OLD OLD OLD	See endnote[9]
870.1200	Acute dermal toxicity – rat	00142436 00142437		OLD OLD	See endnote[10]
870.1300	Acute inhalation toxicity – rat	00151496 00151497		OLD OLD	See endnote[11]
870.2400	Eye irritation	00142438		OLD	See endnote[12]
870.2500	Skin irritation	00142438		OLD	See endnote[13]
870.2600	Skin sensitization	00142439		OLD	See endnote[14]
GENERIC DATA REQUIREMENTS					
850.2100	Acute Avian Oral Toxicity	00142450 00142451		OLD OLD	See endnote[15]

Signature	Name and Title	Date
Ann M. Tillman	Ann M. Tillman, PhD | Agent	Jan. 30, 2019

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Ingredient: Glufosinate-ammonium (CAS No. 77182-82-2; Chemical Code: 128850)

Guideline Reference Number	Guideline Study Name	MRID Number	Submitter	Status	Note
850.2200	Acute Avian Dietary Toxicity	00150988 00150989		OLD OLD	See endnote[16]
850.2400	Wild Mammal Toxicity				See 870 series
850.2300	Avian Reproductive Toxicity	40345649 40345650		OLD OLD	See endnote[17]
850.2500	Simulated or Actual Field Testing				Not required
850.1075	Freshwater Fish Toxicity	00142454 00142455 00144338 00159913 00159914		OLD OLD OLD OLD OLD	See endnote[18]
850.1010	Freshwater Invertebrate Toxicity	00142456 00159915 00144339 00145067		OLD OLD OLD OLD	See endnote[19]
850.1025, 850.1035, 850.1045, 850.1055, 850.1075	Acute Toxicity Estuarine and Marine Organisms	41396104 41396105 41396107 41396108 41396109 41396110 42262403		OLD OLD OLD OLD OLD OLD OLD	See endnote[20]

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Ingredient: Glufosinate-ammonium (CAS No. 77182-82-2; Chemical Code: 128850)

Guideline Reference Number	Guideline Study Name	MRID Number	Submitter	Status	Note
850.1300	Aquatic Invertebrate Life Cycle (Freshwater)	40501010		OLD	See endnote[21]
850.1350	Aquatic Invertebrate Life Cycle (Saltwater)				Not required[22]
850.1400	Fish Early Life Stage (Freshwater)				Not required[23]
850.1400	Fish Early Life Stage (Saltwater)				Not required[24]
850.1500	Life Cycle Fish				Not required[25]
850.1710, 850.1730, 850.1850	Aquatic Organisms Bioavailability, Biomagnification, Toxicity	40501017 41323130		OLD OLD	See endnote[26]
850.1950	Simulated or Actual Field Testing for Aquatic Organisms				Not required
850.1735	Whole Sediment: Acute Freshwater Invertebrates				Not required
850.1740	Whole Sediment: Acute Marine Invertebrates				Not required
N/A	Whole Sediment: Chronic Invertebrate Freshwater and Marine				Not required
850.3020	Honey Bee Acute Contact Toxicity	40345654 41364002		OLD OLD	See endnote[27]
850.3030	Honeybee Toxicity of Residues on Foliage				Not required
850.3040	Field Testing for Pollinators				Not required
870.6100	Delayed Neurotoxicity (Acute) – Hen				Not required

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Ingredient: Glufosinate-ammonium (CAS No. 77182-82-2; Chemical Code: 128850)

Guideline Reference Number	Guideline Study Name	MRID Number	Submitter	Status	Note
870.6200	Acute Neurotoxicity – Rat	45190701 45190702 45190703 45190704		OLD OLD OLD OLD	See endnote[28]
870.3100	90-Day Oral: Rodent	40345609 44076201 44076202 44076203 44076206 44076207 44068501 45179103		OLD OLD OLD OLD OLD OLD OLD OLD	See endnote[29]
870.3150	90-Day Oral: Non-Rodent	40345608 44068502		OLD OLD	See endnote[30]
870.3200	21/28-Day Dermal Toxicity	40345605		OLD	See endnote[31]
870.3250	90-Day Dermal Toxicity				Not required
870.3465	90-Day Inhalation Toxicity	40345606 47058101	 Bayer CropScience LP	OLD PAY	See endnote[32]
870.6100	28-Day Delayed Neurotoxicity Hen				Not required
870.6200	90-Day Neurotoxicity	45179101 45179102 45297001		OLD OLD OLD	See endnote[33]

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Ingredient: Glufosinate-ammonium (CAS No. 77182-82-2; Chemical Code: 128850)

Guideline Reference Number	Guideline Study Name	MRID Number	Submitter	Status	Note
870.4100	Chronic Oral Rodent	40345607 41144701 44539501		OLD OLD OLD	See endnote[34]
870.4200	Carcinogenicity	40345607 40345609 41144701 41144702 44539501		OLD OLD OLD OLD OLD	See endnote[35]
870.3700	Reproduction/Developmental Toxicity Screening Test	00142445 00142446 00151499 00151500 40345610 40345611 41144703 43829405 44076204 44076205 44076209		OLD OLD OLD OLD OLD OLD OLD OLD OLD OLD OLD	See endnote[36]
870.3800	2-Generation Reproduction: Rat	40345612		OLD	See endnote[37]
870.6300	Developmental Neurotoxicity Study	46455701	Bayer CropScience LP	PAY	See endnote[38]

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Ingredient: Glufosinate-ammonium (CAS No. 77182-82-2; Chemical Code: 128850)

Guideline Reference Number	Guideline Study Name	MRID Number	Submitter	Status	Note
870.5100	Bacterial Reverse Mutation Test	00142440 (AC072962)		OLD	See endnote[39]
870.5300, 870.5375	*In vitro* Mammalian Cell Assay	40345616		OLD	See endnote[40]
870.5385, 870.5395, 870.5450, 870.5550	*In vivo* Cytogenetics and Other Effects	00142441 (AC072962) 40345614 41144704		OLD OLD OLD	See endnote[41]
870.7485	Metabolism and Pharmacokinetics	40345640 40345642 43766913 43766914 43778402		OLD OLD OLD OLD OLD	See endnote[42]
870.7200	Companion Animal Safety				Not required
870.7600	Dermal Penetration	40345620 45922103		OLD OLD	See endnote[43]
870.7800	Immunotoxicity	48491101	Bayer CropScience LP	PAY	See endnote[44]
875.1100	Dermal Exposure – Outdoor		PHED	PL	See endnote[45]
875.1200	Dermal Exposure - Indoor				Not required
875.1300	Inhalation Exposure – Outdoor		PHED	PL	See endnote[45]
875.1400	Inhalation Exposure - Indoor				Not required
875.1500	Biological Monitoring		PHED	PL	See endnote[45]

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Ingredient: Glufosinate-ammonium (CAS No. 77182-82-2; Chemical Code: 128850)

Guideline Reference Number	Guideline Study Name	MRID Number	Submitter	Status	Note
875.1600	Data Reporting and Calculations		PHED	PL	See endnote[45]
875.1700	Product Use Information		PHED	PL	See endnote[45]
875.2100	Dislodgeable Foliar Residue and Turf Transferable Residues	45251401		OLD	
875.2200	Soil Residue Dissipation	44972201		OLD	
		44972202		OLD	
		44972203		OLD	
		44972204		OLD	
		44972205		OLD	
		44972206		OLD	
		44972207		OLD	
		44983501		OLD	
		45262901		OLD	
		45262902		OLD	
		45663701		OLD	
		45663702		OLD	
		45663703		OLD	
		46042401		OLD	
		46042402		OLD	
875.2400	Dermal Exposure				See 875.2200
875.2500	Inhalation Exposure				See 875.2200

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Ingredient: Glufosinate-ammonium (CAS No. 77182-82-2; Chemical Code: 128850)

Guideline Reference Number	Guideline Study Name	MRID Number	Submitter	Status	Note
875.2600	Biological Monitoring				See 875.2200
875.2700	Product Use Information				See 875.2200
875.2800	Descriptions of Human Activity				See 875.2200
875.2900	Data Reporting and Calculations				See 875.2200
875.3000	Nondietary Ingestion Exposure				See 875.2200

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Ingredient: Glufosinate-ammonium (CAS No. 77182-82-2; Chemical Code: 128850)

201-1	Droplet Size Spectrum	42565901		OLD	
		42608401		OLD	
		42907401		OLD	
		43254001		OLD	
		43485601		OLD	
		43485602		OLD	
		43485603		OLD	
		43485604		OLD	
		43493801		OLD	
		43493802		OLD	
		43508001		OLD	
		43535801		OLD	
		43535802		OLD	
		43657601		OLD	
		43657602		OLD	
		43665401		OLD	
		43665402		OLD	
		43757801		OLD	
		43757802		OLD	
		43766501		OLD	
		43766502		OLD	
		43766503		OLD	
		43766504		OLD	

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201-1	Droplet Size Spectrum (cont.)	43781101		OLD	
		43803501		OLD	
		43832101		OLD	
		43832102		OLD	
		43845501		OLD	
		43845901		OLD	
		43925701		OLD	
		43953001		OLD	
		43953002		OLD	
		44010201		OLD	
		44070001		OLD	
		44100901		OLD	
		44134101		OLD	
		44178701		OLD	
		44310401		OLD	
		44640801		OLD	
		44640901		OLD	
		44641001		OLD	
		44696901		OLD	
		44747401		OLD	
		44763001		OLD	
		44878601		OLD	
		44908901		OLD	

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Guideline Reference Number	Guideline Study Name	MRID Number	Submitter	Status	Note
201-1	Droplet Size Spectrum (cont.)	45536001		OLD	
202-1	Droplet Size Spectrum				See 201-1
850.4100	Tier 1: Seedling Emergence	41396111		OLD	See endnote[46]
		48531301	Bayer CropScience LP	PAY	
		48718501	Bayer CropScience LP	PAY	
850.4150	Tier 1: Vegetative Vigor	41396112		OLD	See endnote[47]
		41396113		OLD	
		47542602	Bayer CropScience LP	PAY	
850.4400, 850.4500	Tier 1: Aquatic Plant Growth	40345653		OLD	See endnote[48]
		42262404		OLD	
		47542603	Bayer CropScience LP	PAY	
		48444816	Bayer CropScience LP	PAY	
		48444817	Bayer CropScience LP	PAY	
850.4100	Tier 2: Seedling Emergence	41396111		OLD	See endnote[49]
		48531301	Bayer CropScience LP	PAY	
		48718501	Bayer CropScience LP	PAY	
850.4150	Tier 2: Vegetative Vigor	41396112		OLD	See endnote[50]
		41396113		OLD	
		47542602	Bayer CropScience LP	PAY	

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Guideline Reference Number	Guideline Study Name	MRID Number	Submitter	Status	Note
850.4400, 850.4500	Tier 2: Aquatic Plant Growth	40345653		OLD	See endnote[51]
		42262404		OLD	
		47542603	Bayer CropScience LP	PAY	
		48444816	Bayer CropScience LP	PAY	
		48444817	Bayer CropScience LP	PAY	
850.4300	Terrestrial Field				Not required
850.4450	Aquatic Field				Not required
850.4025	Target Area Phytotoxicity				Not required
835.2120	Hydrolysis	40345656		OLD	See endnote[52]
835.2240	Photodegradation in Water	40345657		OLD	See endnote[53]
		41323115		OLD	
835.2410	Photodegradation in Soil	40345658		OLD	See endnote[54]
		41920102		OLD	
835.2370	Photodegradation in Air				Not required
835.4100	Aerobic Soil Metabolism	40345659		OLD	See endnote[55]
		41323118		OLD	
		41323119		OLD	
		41920103		OLD	

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Ingredient: Glufosinate-ammonium (CAS No. 77182-82-2; Chemical Code: 128850)

Guideline Reference Number	Guideline Study Name	MRID Number	Submitter	Status	Note
835.4200	Anaerobic Soil Metabolism	40501014 41323119 41323120 41920103		OLD OLD OLD OLD	See endnote[56]
835.4300	Aerobic Aquatic Metabolism	40345660 45204401 45204402		OLD OLD OLD	See endnote[57]
835.4400	Anaerobic Aquatic Metabolism	46258601	Bayer CropScience LP	PAY	See endnote[58]
835.1230, 835.1240	Leaching/Adsorption/Desorption	40345662 41323121		OLD OLD	See endnote[59]
835.1410	Volatility – Laboratory	41323122 41920104		OLD OLD	See endnote[60]
835.8100	Volatility – Field				Not required
835.6100	Soil Field Dissipation Study	40345663 40345664 40345665 41323124 43110402 43766915 43766916		OLD OLD OLD OLD OLD OLD OLD	See endnote[61]
835.6200	Aquatic Sediment Field Dissipation Study				Not required[62]

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Guideline Reference Number	Guideline Study Name	MRID Number	Submitter	Status	Note
835.6300	Forest Field Dissipation Study				Not required
835.6400	Combination and Tank Mixes				Not required
835.7100	Ground Water Monitoring				Not required
850.6100	Environmental Chemistry Methods	40345666		OLD	See endnote[63]
		41323123		OLD	
		41920106		OLD	
		43766915		OLD	
		47542606	Bayer CropScience LP	PAY	
		47542607	Bayer CropScience LP	PAY	
		49055301	Bayer CropScience LP	PAY	

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Endnotes for Data Matrix for RM Glufosinate-Ammonium Technical

[1] **830.1650 –** These data are not required for registration of a technical product. See 830.1620.

[2] **830.6315 -** Ragan and Massey, Inc. requests a waiver from the requirement of this data requirement since RM Glufosinate-Ammonium Technical is a solid and does not contain flammable components. Please refer to the Confidential Statement of Formula for RM Glufosinate-Ammonium Technical.

[3] **830.6317, 830.6320 -** Per PR Notice 92-5, storage stability and corrosion characteristics data are not required to be submitted unless specifically requested by the Agency. Ragan and Massey, Inc. will submit these data if required as a condition of registration.

[4] **830.6319 -** This data requirement is required when the product is an end use product and an emulsifiable liquid to be diluted with petroleum solvents. RM Glufosinate-Ammonium Technical is not an end-use product to be diluted with petroleum solvents prior to application. Therefore, these data are not applicable to RM Glufosinate-Ammonium Technical.

[5] **830.6321 -** These data are not required for registration of a technical product and are not applicable to RM Glufosinate-Ammonium Technical.

[6] **830.7100 -** These data are required when the product is a liquid. RM Glufosinate-Ammonium Technical is a solid and these data are not required.

[7] **830.7220 -** This guideline is not applicable to solid products.

[8] **830.7520 -** Ragan and Massey, Inc. is seeking a waiver for this data requirement for RM Glufosinate-Ammonium Technical because the product is not water insoluble and it is not a fibrous material.

[9] **870.1100** – The studies cited are acceptable and satisfy the data requirement as per the July 25, 2012 Glufosinate Ammonium - Updated Human Health Risk Assessment for the Proposed New Use of Glufosinate Ammonium in/on Citrus Fruit (Crop Group 10), Pome Fruit (Crop Group 11), Stone Fruit (Crop Group 12), Olives and Sweet Corn (DP Barcode D387413) (Human Health RA).

[10] **870.1200** – The studies cited are acceptable and satisfy the data requirement as per the Human Health RA.

[11] **870.1300** – The studies cited are acceptable and satisfy the data requirement as per the Human Health RA.

[12] **870.2400** – The study cited is acceptable and satisfies the data requirement as per the Human Health RA.

[13] **870.2500** – The study cited is acceptable and satisfies the data requirement as per the Human Health RA.

[14] **870.2600** – The study cited is acceptable and satisfies the data requirement as per the Human Health RA.

[15] **850.2100** – The studies cited are acceptable and satisfy the data requirement as per the Sept. 12, 2014 Environmental Fate and Ecological Risk Assessment for the Registration Review of Glufosinate (EFED RA). Passerine data have not been submitted and these data were not required in the Registration Review DCI.

[16] **850.2200** – The studies cited are acceptable and satisfy the data requirement as per the EFED RA.

[17] **850.2300** – The studies cited are acceptable and satisfy the data requirement as per the EFED RA. Newly submitted data that are duplicative of previously submitted data are not cited.

[18] **850.1075** – The studies cited are acceptable or supplemental but satisfy the data requirement as per the EFED RA. Newly submitted data that are duplicative of previously submitted data are not cited.

[19] **850.1010** – The studies cited are acceptable or supplemental but satisfy the data requirement as per the EFED RA. Newly submitted data that are duplicative of previously submitted data are not cited.

[20] **850.1025, 850.1035, 850.1045, 850.1055, 850.1075** – The studies cited are acceptable or supplemental but satisfy the data requirement as per the EFED RA.

Endnotes for Data Matrix for RM Glufosinate-Ammonium Technical

[21] **850.1300** – The study cited is acceptable and satisfies the data requirement as per the EFED RA. Newly submitted data that are duplicative of previously submitted data are not cited.

[22] **850.1350** – These data have not been submitted nor are required for Registration Review as per the EFED RA.

[23] **850.1400** – These data have not been submitted nor are required for Registration Review as per the EFED RA.

[24] **850.1400** – These data have not been submitted nor are required for Registration Review as per the EFED RA.

[25] **850.1500** – These data have not been submitted nor are required for Registration Review as per the EFED RA.

[26] **850.1710, 850.1730, 850.1850** – The studies cited are acceptable or supplemental but satisfy the data requirement as per the EFED RA.

[27] **850.3020** – The studies cited are acceptable or supplemental but satisfy the data requirement as per the EFED RA.

[28] **870.6200** – The studies cited are acceptable and satisfy the data requirement as per the Human Health RA.

[29] **870.3100** – The studies cited are acceptable and satisfy the data requirement as per the Human Health RA.

[30] **870.3150** – The studies cited are acceptable and satisfy the data requirement as per the Human Health RA.

[31] **870.3200** – The study cited is acceptable and satisfies the data requirement as per the Human Health RA.

[32] **870.3465** – The studies cited are acceptable or supplemental but satisfy the data requirement as per the Human Health RA.

[33] **870.6200** – The studies cited are acceptable and satisfy the data requirement as per the Human Health RA. Unacceptable data are not cited.

[34] **870.4100** – The studies cited are acceptable or supplemental but satisfy the data requirement as per the Human Health RA. Chronic dog data are not cited as these data are no longer required per the 2007 revisions to 40 CFR Part 158.

[35] **870.4200** – The studies cited are acceptable and satisfy the data requirement as per the Human Health RA.

[36] **870.3700** – The studies cited are acceptable and satisfy the data requirement as per the Human Health RA. Unacceptable data are not cited.

[37] **870.3800** – The study cited is acceptable and satisfies the data requirement as per the Human Health RA.

[38] **870.6300** – The study cited is acceptable and satisfies the data requirement as per the Human Health RA.

[39] **870.5100** – The study cited is acceptable and satisfies the data requirement as per the Human Health RA.

[40] **870.5300, 830.5375** – The study cited is acceptable and satisfies the data requirement as per the Human Health RA. Note: the incorrect MRID number was listed in the Human Health RA; the correct MRID number is cited.

[41] **870.5385, 870.5395, 870.5450, 870.5550** – The studies cited are acceptable and satisfy the data requirement as per the Human Health RA.

Endnotes for Data Matrix for RM Glufosinate-Ammonium Technical

[42] **870.7485** – The studies cited are acceptable and satisfy the data requirement as per the Human Health RA.

[43] **870.7600** – The studies cited are acceptable and satisfy the data requirement as per the Human Health RA.

[44] **870.7800** – The study cited is acceptable and satisfies the data requirement as per the Human Health RA.

[45] **875.1100, 875.1300, 875.1500, 875.1600, 875.1700** – PHED data were used to determine Short/Intermediate Term Agricultural Handler Exposure and Risk Estimates for Glufosinate Ammonium (Spot/Directed Spray Applications) in the Human Health RA.

[46] **850.4100** – The studies cited are supplemental but appear to satisfy the data requirement as per the EFED RA.

[47] **850.4150** – The studies cited are supplemental but appear to satisfy the data requirement as per the EFED RA.

[48] **850.4400, 850.4500** – The studies cited are acceptable or supplemental but appear to satisfy the data requirement as per the EFED RA. Additional data that were submitted, but not required, are not cited.

[49] **850.4100** – The studies cited are supplemental but appear to satisfy the data requirement as per the EFED RA.

[50] **850.4150** – The studies cited are supplemental but appear to satisfy the data requirement as per the EFED RA.

[51] **850.4400, 850.4500** – The studies cited are acceptable or supplemental but appear to satisfy the data requirement as per the EFED RA. Additional data that were submitted, but not required, are not cited.

[52] **835.2120** – The study cited is acceptable and satisfies the data requirement as per the EFED RA.

[53] **835.2240** – The studies cited are acceptable or supplemental but satisfy the data requirement as per the EFED RA.

[54] **835.2410** – The studies cited are acceptable or supplemental but satisfy the data requirement as per the EFED RA; unacceptable data are not cited.

[55] **835.4100** – The studies cited are acceptable or supplemental but satisfy the data requirement as per the EFED RA; unacceptable data are not cited.

[56] **835.4200** – The studies cited are acceptable or supplemental but satisfy the data requirement as per the EFED RA.

[57] **835.4300** – The studies cited are acceptable or supplemental but satisfy the data requirement as per the EFED RA.

[58] **835.4400** – The study cited is supplemental but satisfies the data requirement as per the EFED RA; unacceptable data are not cited.

[59] **835.1230, 835.1240** – The studies cited are acceptable or supplemental but satisfy the data requirement as per the EFED RA; unacceptable data are not cited.

[60] **835.1410** – The studies cited are acceptable and satisfy the data requirement as per the EFED RA.

[61] **835.6100** – The studies cited are acceptable or supplemental but satisfy the data requirement as per the EFED RA; unacceptable or upgradeable data are not cited.

[62] **835.6200** – These data are not required based on the uses proposed to be registered.

[63] **850.6100** – The studies cited, as well as MRID 49055301, appear to satisfy the data requirement as per the EFED RA.

EXHIBIT C

Agricultural Handler Exposure Task Force

List of AHETF Compensable Data on Which RM Relies

AHETF Study No.	Study Title	EPA Submission Date	EPA MRID Number
AHE14	Validation of a Method for the Analysis of Malathion and Diazinon in Sock Matrix	08/30/05	46634106
AHE13-Reissue	Determination of Dermal and Inhalation Exposure to Workers During Closed-System Loading and ULV Application of a Liquid Pesticide Product to Cotton	02/16/06	46763702
AHE05	Determination of the Percent Active Ingredient of Emulsifiable Concentrate Formulations of Malathion for Use in an AHETF Applicator Exposure Greenhouse Study and an ARTF Worker Re-entry Exposure Greenhouse Study	08/23/07	47212801
AHE17	Determination of Dermal and Inhalation Exposure to Workers in Southern Illinois Open Pour Mixing/Loading a Dry Flowable Pesticide Product and During Application to Various Sites by a Variety of Application Methods	08/23/07	47212805
AHE18	Determination of Dermal and Inhalation Exposure to Workers in the Pacific Northwest During Open Pour Mixing/Loading a Dry Flowable Pesticide Product and During Application to Various Sites by a Variety of Application Methods	08/23/07	47212806
AHE20	Determination of Dermal and Inhalation Exposure to Workers in Southern Georgia During Open Pour Mixing/Loading a Dry Flowable Pesticide Product and During Application to Various Sites by a Variety of Application Methods	08/23/07	47212808
AHE21	Determination of Dermal and Inhalation Exposure to Workers in Northern Florida During Open Pour Mixing/Loading a Dry Flowable Pesticide Product and During Application to Various Sites by a Variety of Application Methods	08/23/07	47212809
AHE26	Validation of Methods for the Analysis of Simazine in Inner Dosimeter, Hand Wash, Face-Neck Wipe and OVS Tube Matrices	08/23/07	47212802
AHE28	Determination of the Simazine (AI) Concentration in Princep® Caliber 90® and Princep®	08/23/07	47212803
AHE29	Determination of the Chlorothalonil (AI) Concentration in Equus® DF Dry Flowable and Equus® 720 SST Flowable Formulated Products	08/23/07	47212804
AHE30	Determination of Dermal and Inhalation Exposure to Workers in Oregon During Banded Applications to Crops Using Open Cab Groundboom Equipment and During Open Pour Mixing/Loading a Liquid Pesticide Product	12/21/07	47309201
AHE31	Determination of Dermal and Inhalation Exposure to Workers in California During Broadcast Applications in Orchards Using Open Cab Groundboom Equipment and	12/21/07	47309202

AHETF Study No.	Study Title	EPA Submission Date	EPA MRID Number
	During Open Pour Mixing/Loading a Liquid Pesticide Product		
AHE32	Determination of Dermal and Inhalation Exposure to Workers in Florida and Southern Georgia During Broadcast Applications in Field Crops and Turf Using Open Cab Groundboom Equipment and During Open Pour Mixing/Loading a Liquid Pesticide Product	12/21/07	47309203
AHE40	Determination of Dermal and Inhalation Exposure to Workers in Georgia During Applications Using Open Cab Groundboom Equipment and During Open Pour Mixing/Loading a Liquid Pesticide Product	12/21/07	47309204
AHE47	Validation of LC/MS/MS Methods for the Analysis of Exposure Matrices for Chlorothalonil	12/21/07	47309206
AHE46	Validation of AHETF Method AHETF-AM-018, “Determination of Diazinon/Malathion in Cotton Inner Dosimeters Sectioned into Two Parts”	02/15/08	47348701
AHE61	Validation of Worker Exposure Methods for the Analysis of Glyphosate in Worker Exposure Matrices	08/20/10	48200402
AHE201	Validation of a Method for the Analysis of Chlorothalonil in Two-piece Inner Dosimeter Exposure Matrix	08/20/10	48200403
AHE70	Determination of Dermal and Inhalation Exposure to Pilots During Aerial Applications of Liquid Pesticide Sprays Using Closed Cockpit Aircraft in the United States	12/22/11	48706701
AHE67	Validation of Inner Dosimeter, Face/Neck Wipe, Hand Wash and OVS Tube Methods for the Analysis of 2,4-D and 2,4-DB in Exposure Matrices	12/22/11	48706703
AHE209	Determination of the Freezer Storage Stability of Glyphosate in/on Worker Exposure Matrices	12/22/11	48706704
AHE68	Determination of the Freezer Storage Stability of 2,4-D and 2,4-DB in/on Worker Exposure Matrices	01/05/12	48713901
AHE211	Validation of Worker Exposure Analytical Methods for the Analysis of Imazapyr in Worker Exposure Matrices	09/05/14	49462402
AHE215	Validation of a Worker Exposure Sock Matrix Method for the Analysis of 2,4-D and 2,4-DB	09/05/14	49462403
AHE217	Determination of the Freezer Storage Stability of Imazapyr in/on Worker Exposure Matrices	09/05/14	49462405
AHE400	Determination of Dermal and Inhalation Exposure to Workers during Backpack and Handgun Application of Liquid Sprays in Utilities Rights-of-Way	09/22/14	49472001
AHE500	Determination of Dermal and Inhalation Exposure to Workers during Closed System Loading of Liquids in Returnable and Non-Returnable Containers	04/25/19	50846201

AHETF Study No.	Study Title	EPA Submission Date	EPA MRID Number
Purchased Study: 501-M-1 501-A-1	Evaluation of Worker Exposures to Tribufos During Aerial and Ground Applications of DEF 6 to Cotton	01/25/93	42685901
Monograph Reports			
AHE1012	Agricultural Handler Exposure Scenario Monograph: Backpack Application of Liquid Sprays in Utilities Rights-of-Way	09/30/14	49478601
AHE1013	Agricultural Handler Exposure Scenario Monograph: Handgun Application of Liquid Sprays in Utilities Rights-of-Way	09/30/14	49478602
AHE1003-1 Resub.	**Resubmission** - Agricultural Handler Exposure Scenario Monograph: Open Pour Mixing and Loading of Liquid Formulations – dated March 31, 2015	04/06/15	49609202
AHE1007-1 Resub.	**Resubmission -** Agricultural Handler Exposure Scenario Monograph: Closed Cockpit Aerial Application of Liquid Sprays	11/05/15	49761201
AHE1009-1 Resub.	**Resubmission -** Agricultural Handler Exposure Scenario Monograph: Closed Cab Ground Liquid Spray Applications	11/05/15	49761202
AHE1004-1 Resub.	**Resubmission -** Agricultural Handler Exposure Scenario Monograph: Open Cab Ground Boom Applications	02/09/17	50182201
AHE1022	Agricultural Handler Exposure Scenario Monograph: Mechanical Transfer of Liquids	09/03/19	50940301

EXHIBIT D

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Pesticide Programs
Registration Division (7505P)
1200 Pennsylvania Ave., N.W.
Washington, D.C. 20460

NOTICE OF PESTICIDE:
_X_ Registration
___ Reregistration
(under FIFRA, as amended)

EPA Reg. Number:	**Date of Issuance:**
84009-35	11/18/19

Term of Issuance:
Unconditional

Name of Pesticide Product:
RM Glufosinate

Name and Address of Registrant (include ZIP Code):

Ragan and Massey, Inc
c/o Pyxis Regulatory Consulting, Inc
4110 136th St. Ct. NW
Gog Harbor, WA 98332

Note: Changes in labeling differing in substance from that accepted in connection with this registration must be submitted to and accepted by the Registration Division prior to use of the label in commerce. In any correspondence on this product always refer to the above EPA registration number.

On the basis of information furnished by the registrant, the above named pesticide is hereby registered under the Federal Insecticide, Fungicide and Rodenticide Act.

Registration is in no way to be construed as an endorsement or recommendation of this product by the Agency. In order to protect health and the environment, the Administrator, on his motion, may at any time suspend or cancel the registration of a pesticide in accordance with the Act. The acceptance of any name in connection with the registration of a product under this Act is not to be construed as giving the registrant a right to exclusive use of the name or to its use if it has been covered by others.

This product is unconditionally registered in accordance with FIFRA section 3(c)(5) provided that you:

1. Submit and/or cite all data required for registration/reregistration/registration review of your product when the Agency requires all registrants of similar products to submit such data.

Signature of Approving Official:

Erik Kraft, Product Manager 24
Fungicide Herbicide Branch, Registration Division (7505P)

Date:
11/18/19

EPA Form 8570-6

2. Make the following label changes before you release the product for shipment:

    - Revise the EPA Registration Number to read, "EPA Reg. No. 84009-35."

3. Submit one copy of the revised final printed label for the record before you release the product for shipment.

Should you wish to add/retain a reference to the company's website on your label, then please be aware that the website becomes labeling under the Federal Insecticide Fungicide and Rodenticide Act and is subject to review by the Agency. If the website is false or misleading, the product would be misbranded and unlawful to sell or distribute under FIFRA section 12(a)(1)(E). 40 CFR 156.10(a)(5) list examples of statements EPA may consider false or misleading. In addition, regardless of whether a website is referenced on your product's label, claims made on the website may not substantially differ from those claims approved through the registration process. Therefore, should the Agency find or if it is brought to our attention that a website contains false or misleading statements or claims substantially differing from the EPA approved registration, the website will be referred to the EPA's Office of Enforcement and Compliance.

If these conditions are not complied with, the registration will be subject to cancellation in accordance with FIFRA section 6. Your release for shipment of the product constitutes acceptance of these conditions. A stamped copy of the label is enclosed for your records. Please also note that the record for this product currently contains the following CSFs:

- Basic CSF dated 03/01/2019
- Alternate CSF 1 dated 03/01/2019

If you have any questions, please contact Manjula Unnikrishnan by phone at 703-347-8520, or via email at Unnikrishnan.manjula@epa.gov

Enclosure

[Note to reviewer: [Text] in brackets denotes optional text].
[Note to reviewer: {Text} in braces denotes where in the final label text will appear.]

{[BOOKLET FRONT PANEL LANGUAGE]}

RM GLUFOSINATE

[Alternate Brand Names: Compare-N-Save® Weed & Grass Killer with Glufosinate; FarmWorks® Weed & Grass Killer with Glufosinate; Farm General™ Weed & Grass Killer with Glufosinate]

FOR NONSELECTIVE WEED CONTROL OF EMERGED WEEDS IN NONCROP AREAS

GLUFOSINATE	GROUP	10	HERBICIDE

ACTIVE INGREDIENT:
Glufosinate ammonium 11.33%
OTHER INGREDIENTS: 88.67%
TOTAL: 100.00%
Equivalent to 1 lb. of active ingredient per U.S. gallon.

KEEP OUT OF REACH OF CHILDREN

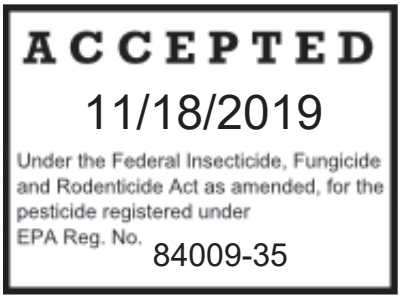
WARNING-AVISO

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand the label, find someone to explain it to you in detail.)

[See] [inside] [attached] [label] [booklet] [for] [First Aid][,] [additional] [Precautionary Statements][,] [and] [Directions for Use] [including] [and] [Storage and Disposal] [instructions].

EPA Reg. No. 84009-xx
EPA Est. No.

Manufactured For:
Ragan & Massey, Inc.
101 Ponchatoula Parkway
Ponchatoula, LA 70454



Net Contents:

{LANGUAGE INSIDE BOOKLET}

FIRST AID	
If swallowed:	• Call a poison control center or doctor immediately for treatment advice. • Have person sip a glass of water if able to swallow. • Do not induce vomiting unless told to do so by a poison control center or doctor. • Do not give anything by mouth to an unconscious person.
If in eyes:	• Hold eye open and rinse slowly and gently with water for 15-20 minutes. • Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. • Call a poison control center or doctor for treatment advice.
If on skin or clothing:	• Take off contaminated clothing. • Rinse skin immediately with plenty of water for 15-20 minutes. • Call a poison control center or doctor for treatment advice.
If inhaled:	• Move person to fresh air. • If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably by mouth-to-mouth if possible. • Call a poison control center or doctor for treatment advice.
HOT LINE NUMBER	
Have the product container or label with you when calling a poison control center or doctor, or going for treatment. For emergency information concerning this product call your poison control center at 1-800-222-1222.	
NOTE TO PHYSICIAN: If this product is ingested, endotracheal intubation and gastric lavage should be performed as soon as possible, followed by charcoal and sodium sulfate administration.	

PRECAUTIONARY STATEMENTS
HAZARDS TO HUMANS AND DOMESTIC ANIMALS
WARNING

Causes substantial but temporary eye injury. Harmful if swallowed, inhaled, or absorbed through skin. Avoid contact with skin, eyes, or clothing. Avoid breathing vapor or spray mist. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, using tobacco or using the toilet. Remove and wash contaminated clothing before reuse.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Applicators and other handlers must wear:

- Long-sleeved shirt and long pants;
- Chemical-resistant gloves including barrier laminate, butyl rubber ≥14 mils, nitrile rubber ≥14 mils, neoprene rubber ≥14 mils, polyvinyl chloride (PVC) ≥14 mils, or Viton® ≥14 mils;
- Shoes plus socks;
- Protective eyewear

Discard clothing and other absorbent materials that have been drenched or heavily contaminated with this product's concentrate. **DO NOT** reuse them. Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables exist, use detergent and hot water. Keep and wash PPE separately from other laundry.

USER SAFETY RECOMMENDATIONS

Users should:

- Remove clothing/PPE immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
- Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

ENVIRONMENTAL HAZARDS

DO NOT apply directly to water, or to areas where surface water is present, or to intertidal areas below the mean high water mark. **DO NOT** clean equipment or dispose of equipment washwaters in a manner that will contaminate water resources or arable land. Glufosinate-ammonium and its degradates have those properties normally associated with pesticides that have been detected in groundwater. Use of this product in areas with coarse soils and high water tables may result in groundwater contamination.

PHYSICAL OR CHEMICAL HAZARDS

DO NOT mix or allow contact with oxidizing agents. Hazardous chemical reaction may occur.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

DO NOT use this product until you have read the entire label. **DO NOT** apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application.

For any requirements specific to your State or Tribe, consult the agency responsible for pesticide regulation.

Restriction: In the State of New York only: Not for use in Nassau and Suffolk Counties.

AGRICULTURAL USE REQUIREMENTS

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR part 170. This Standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses; and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification, and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about personal protective equipment (PPE), and restricted-entry intervals. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard.

Do not enter or allow worker entry into treated areas during the restricted entry-interval (REI) of 12 hours.

PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, including plants, soil, or water, is: coveralls; chemical-resistant gloves including barrier laminate, butyl rubber ≥14 mils, nitrile rubber ≥14 mils, neoprene rubber ≥14 mils, polyvinyl chloride (PVC) ≥14 mils, or Viton ≥14 mils; shoes plus socks; protective eyewear.

NON-AGRICULTURAL USE REQUIREMENTS

The requirements in this box apply to uses of this product that are NOT within the scope of the Worker Protection Standard for agricultural pesticides (40 CFR Part 170). The WPS applies when this product is used to produce agricultural plants on farms, forests, nurseries, or greenhouses.

The application for trimming and edging, industrial, recreational and public areas, and farmsteads are not within the scope of the WPS.

MANDATORY SPRAY DRIFT MITIGATION

- When making applications via aerial application equipment, the spray boom must be mounted on the aircraft so as to minimize drift caused by wing tip or rotor blade vortices. The boom length must not exceed 75% of the wingspan or 90% of the rotor blade diameter.
- When making applications via aerial application equipment, applicators must use ½ swath displacement upwind at the downwind edge of the field.
- Do not apply when wind speeds exceed 10 miles per hour at the application site.
- Do not apply during temperature inversions.
- For aerial applications, do not release spray at a height greater than 10 ft above the target canopy, unless a greater application height is necessary for pilot safety.
- For ground applications and aerial applications, select nozzle and pressure that deliver medium to coarse spray droplets as indicated in nozzle manufacturer's catalogues and in accordance with ASABE Standard 572.1.
- Spray at the appropriate boom height based on nozzle selection and nozzle spacing, but do not exceed a boom height of 24 inches above target pest or target canopy. Set boom to lowest effective height over the target pest or target canopy based on equipment manufacturer's directions. Automated boom height controllers are recommended with large booms to better maintain optimum nozzle to canopy height. Excessive boom height will increase the potential for spray drift.
- For non-crop vegetation management ground applications, apply with the nozzle height no more than 4 feet above the ground or target vegetation, unless necessitated by the application equipment. Examples would include roadside, railroad, utility rights of way, forestry and other industrial vegetation management applications where safety or natural barriers obstruct application.

SPRAY DRIFT ADVISORIES

POLLINATOR ADVISORY
This product contains an herbicide. Follow all label directions and precautions to minimize potential off-target exposure in order to prevent effects to non-target plants adjacent to the treated site which may serve as habitat or forage for pollinators.

The interaction of many equipment and weather-related factors determines the potential for spray drift. The applicator is responsible for considering all these factors when making application decisions.

IMPORTANCE OF DROPLET SIZE
The most effective way to reduce drift potential is to apply large droplets. The best drift management strategy is to apply the largest droplets that provide sufficient coverage and control. The presence of sensitive species nearby, the environmental conditions, and pest pressure may affect how an applicator balances drift control and coverage. APPLYING LARGER DROPLETS REDUCES DRIFT POTENTIAL BUT WILL NOT PREVENT DRIFT IF APPLICATIONS ARE MADE IMPROPERLY OR UNDER UNFAVORABLE ENVIRONMENTAL CONDITIONS! See Wind, Temperature and Humidity, and Temperature Inversions sections of this label.

Controlling Droplet Size – Ground Boom
- Volume - Use high flow rate nozzles to apply the highest practical spray volume. Nozzles with higher rated flows produce larger droplets.
- Pressure - Use the lower spray pressures recommended for the nozzle. Higher pressure reduces droplet size and does not improve canopy penetration. WHEN HIGHER FLOW RATES ARE NEEDED, USE A HIGHER-CAPACITY NOZZLE INSTEAD OF INCREASING PRESSURE.
- Nozzle Type - Use a nozzle type that is designed for the intended application. With most nozzle types, narrower spray angles produce larger droplets. Consider using low-drift nozzles.

Controlling Droplet Size – Aircraft
- Number of Nozzles - Use the minimum number of nozzles with the highest flow rate that provide uniform coverage.
- Nozzle Orientation - Orienting nozzles so that the spray is emitted backwards, parallel to the airstream will produce larger droplets than other orientations. AVOIDING SPRAY DRIFT IS THE RESPONSIBILITY OF THE

APPLICATOR.

- Nozzle Type - Solid stream nozzles (such as disc and core with swirl plate removed) oriented straight back produce larger droplets than other nozzle types.
- Boom Length - Longer booms increase drift potential. Therefore, a shorter boom length is recommended.
- Application Height - Application more than 10 ft. above the canopy increases the potential for spray drift.

BOOM HEIGHT

Setting the boom at the lowest referenced height (if specified) which provides uniform coverage reduces the exposure of droplets to evaporation and wind. For ground equipment, the boom should remain level with the crop and have minimal bounce.

DRIFT REDUCTION TECHNOLOGY (DRT)

The EPA Drift Reduction Technology (DRT) Program was developed to encourage the manufacture, marketing, and use of spray technologies scientifically verified to significantly reduce pesticide drift. The use of DRTs should result in significantly less pesticide from spray applications drifting and being deposited in areas not targeted by those applications, compared to spray technologies that do not meet the minimum DRT standard. EPA-verified drift reduction technologies (DRTs) and their ratings will be added to the following webpage as they become available: https://www.epa.gov/reducing-pesticide-drift/epa-verified-and-rated-drift-reduction-technologies

WIND

Drift potential increases at wind speeds of less than 3 mph (due to inversion potential) or more than 10 mph. However, many factors, including droplet size and equipment type determine drift potential at any given wind speed. AVOID APPLICATIONS DURING GUSTY OR WINDLESS CONDITIONS.

Note: Local terrain can influence wind patterns. Every applicator needs to be familiar be familiar with local wind patterns and how they affect spray drift.

TEMPERATURE AND HUMIDITY

When making applications in hot and dry conditions, set up equipment to produce larger droplets to reduce effects of evaporation.

TEMPERATURE INVERSIONS

Drift potential is high during a temperature inversion. Temperature inversions restrict vertical air mixing, which causes small suspended droplets to remain close to the ground and move laterally in a concentrated cloud. Temperature inversions are characterized by increasing temperature with altitude and are common on nights with limited cloud cover and light to no wind. They begin to form as the sun sets and often continue into the morning. Their presence can be indicated by ground fog; however, if fog is not present, inversions can also be identified by the movement of smoke from a ground source or an aircraft smoke generator. Smoke that layers and moves laterally in a concentrated cloud (under low wind conditions) indicates an inversion, while smoke that moves upward and rapidly dissipates indicates good vertical air mixing.

SHIELDED SPRAYERS

Shielding the boom or individual nozzles can reduce the effects of wind. However, it is the responsibility of the applicator to verify that the shields are preventing drift and not interfering with uniform deposition of the product.

RESISTANCE MANAGEMENT

For resistance management, RM Glufosinate is a Group 10 herbicide. Any weed population may contain or develop plants naturally resistant to RM Glufosinate and other Group 10 herbicides. The resistant biotypes may dominate the weed population if these herbicides are used repeatedly in the same use site. Follow appropriate resistance-management strategies.

To delay herbicide resistance take one or more of the following steps:

- Avoid the consecutive use of RM Glufosinate or other target site of action Group 10 herbicides that might have a similar target site of action, on the same weed species.
- Use tank mixtures or premixes with herbicides from different target site of action Groups as long as the involved products are all registered for the same use, have different sites of action and are both effective at the tank mix or prepack rate on the weed(s) of concern.
- Base herbicide use on a comprehensive Integrated Pest Management (IPM) program.
- Scout fields prior to application to identify the weed species present and their growth state to determine if the intended application will be effective.
- Scout fields after application to verify that the treatment was effective and to monitor weed populations for early signs of resistance development.
- Contact your local extension specialist, certified crop advisors and/or manufacturer for herbicide resistance management and/or integrated weed management recommendations for specific crops and resistant weed biotypes.

Suspected herbicide-resistant weeds may be identified by these indicators:

- Failure to control a weed species normally controlled by the herbicide at the dose applied, especially if control is achieved on adjacent weeds;
- A spreading patch of non-controlled plants of a particular weed species; and
- Surviving plants mixed with controlled individuals of the same species.

Report any incidence of non-performance of this product against a particular weed species to your Ragan & Massey, Inc. retailer, representative or call 800-264-5281. If resistance is suspected, treat weed escapes with an herbicide having a different mechanism of action and/or use non-chemicals means to remove escapes, as practical, with the goal of preventing further seed production.

PRODUCT INFORMATION

RM Glufosinate is a nonselective water-soluble herbicide for application as a foliar spray for the control of a broad spectrum of emerged annual and perennial grass and broadleaf weeds. RM Glufosinate will also control certain woody species. Plants that have not yet emerged at the time of application will not be controlled. THOROUGH SPRAY COVERAGE IS IMPORTANT. Visual effects and control from application of RM Glufosinate occur within 2 to 4 days after application under good growing conditions.

This product is nonselective and will injure or kill all green vegetation contacted by the spray. Avoid all contact with foliage or green tissue of desirable vegetation. Avoid direct spray contact with green, thin, or uncalloused bark of desirable vegetation or plant injury may result. If desirable vegetation is contacted, rinse the sprayed portion with water immediately.

RM Glufosinate works best when weeds are actively growing. Weed control may be reduced when applications are made to weeds under stress due to drought or cool temperatures. Weeds under stress or in dense populations will require application at the highest rate specified. Refer to the How to Apply section of this label.

NONCROP USES

When applied as directed in this label, RM Glufosinate controls annual and perennial weeds. Refer to the *How to Apply* section of this labeling for specified rates and a list of weeds controlled. Applications may be made on a broadcast, banded or spot treatment basis depending on the situation. Avoid direct spray or drift to desirable vegetation. Regrowth may occur due to the weed stage of growth at application, low use rate, or environmental conditions. Repeat treatments may be necessary to control plants generating from underground parts or seed.

WHEN TO APPLY

RM Glufosinate is a foliar-active material. Best results are obtained when weeds are actively growing. Weed control may be reduced when applications are made to weeds under stress due to drought or cool temperatures. Weeds under stress or in dense populations will require application of the highest rate specified. Refer to the *How to Apply* section of this label.

Apply RM Glufosinate at the rate specified in the *How to Apply* section of this label. Repeat applications of RM Glufosinate or tank mixes of RM Glufosinate plus one or more appropriate residual herbicide(s) listed on this label will be needed to control weeds emerging from underground parts or seeds.

HOW TO MIX

RM Glufosinate must be mixed with water to make a finished spray solution as follows:

1. Fill the spray tank with the required amount of water.
2. Add the proper amount of this product, then mix thoroughly.

HOW TO APPLY

Spot or Directed Applications

Use this product as a spot or directed spray application using 2 to 4 fluid ounces of product (0.02 to 0.03 lb. a.i.) per gallon of water. Mix 2 to 4 fluid ounces of product (0.02 to 0.03 lb. a.i.) per gallon of water depending upon the weed and stage of growth as shown in the following sections. Spray undesirable vegetation foliage on a spray-to-wet basis. Ensure uniform and complete coverage. Use a coarse spray. Backpack, pump-up, and hydraulic sprayers may be used. Thoroughly clean the sprayer following use.

Broadcast or Boom Applications

Apply 64 to 192 fluid ounces (2 to 6 quarts) of product (0.5 to 1.5 lbs. a.i.) per acre depending upon the weed and stage of growth as shown in the following sections. Use a minimum of 40 gallons of water per acre with a minimum of 30-psi spray pressure.

Aerial Applications

Apply as a foliar treatment using a minimum of 5 gallons of water per acre to ensure thorough coverage.

Tank Mixes for Noncrop Uses

RM Glufosinate is compatible in tank mixes with many other herbicides including non-selective herbicides including glyphosate. *It is the pesticide user's responsibility to ensure that all products are registered for the intended use. Read and follow the applicable restrictions and limitations and directions for use on all product labels involved in tank mixing. Users must follow the most restrictive directions for use and precautionary statements of each product in the tank mixture.*

Tank mix applications of RM Glufosinate plus products containing the following active ingredients can be used for broad-spectrum postemergence and preemergence weed control.

Imazapyr	Oryzalin
Prodiamine	Dicamba DGA Salt
Isoxaben	Oxadiazon
Pendimethalin	

A compatibility test must be conducted with any potential tank mix partner with RM Glufosinate, except with any one of those listed above. Using a clear glass quart jar, conduct the test as described below:

1. Fill the jar three-quarters full with water.
2. Add the appropriate amount of herbicide in the following order: (a) dry flowable, (b) wettable powder, (c) aqueous suspensions, (d) flowables, (e) liquids and (f) solutions and emulsifiable or liquid concentrates. Shake or gently stir jar after each addition to thoroughly mix.
3. After adding all ingredients, let the mixture stand for 15 minutes and then look for separation, large flakes, precipitates, gels, and heavy oily film on the jar or other signs of incompatibility.
4. If the compatibility test shows signs of incompatibility, **DO NOT** tank mix the product tested with RM Glufosinate.

Weeds Controlled by RM Glufosinate For spot application:

Apply 2 fluid ounces of product (0.02 lb. a.i.) per gallon of water when the weed height or diameter is less than 6 inches.
Apply 3 fluid ounces of product (0.023 lb. a.i.) per gallon of water when the weed height or diameter is 6 inches or greater.

For broadcast application:

Apply 96 fluid ounces (3 quarts) of product (0.75 lb. a.i.) per acre when the weed height or diameter is less than 6 inches.
Apply 128 fluid ounces (4 quarts) of product (1.0 lb. a.i.) per acre when the weed height or diameter is 6 inches or greater.

Broadleaf Weeds
chickweed
clover
common cocklebur
filaree
jimsonweed
kochia
London rocket
malva (little mallow)
marestail
purslane
shepherdspurse
smartweed

Grasses and Sedges
barnyardgrass
cupgrass
fall panicum
giant foxtail
goosegrass
green foxtail
Johnsongrass (rhizome)
lovegrass
shattercane
smallflower Alexandergrass (signal grass)
stinkgrass
windgrass
yellow foxtail

For spot application:

Apply 3 fluid ounces of product (0.023 lb. a.i.) per gallon of water when the weed height or diameter is less than 6 inches.
Apply 4 fluid ounces of product (0.03 lb. a.i.) per gallon of water when the weed height or diameter is 6 inches or greater.

For broadcast application:

Apply 128 fluid ounces (4 quarts) of product (1.0 lb. a.i.) per acre when the weed height or diameter is less than 8 inches tall.
Apply 192 fluid ounces (6 quarts) of product (1.5 lbs. a.i.) per acre when the weed height or diameter is 8 inches or greater.

Broadleaf Weeds
annual sowthistle
bindweed
buffalobur
burdock
Canada thistle
curly dock
dandelion
dogbane (hemp)
field gromwell
fleabane
goldenrod
horsetail
lambsquarters
leafy spurge
mugwort
musk thistle
nettle
nightshade
pennycress
pigweed, red root
plantain
prickly lettuce
ragweed
Russian thistle
tansy mustard
velvetleaf
vervain
Virginia copperleaf
white heath aster
wild buckwheat
wild mustard
wild onion
wild rose
wild turnip
woodsorrel
yellow rocket

Grasses and Sedges
annual bluegrass
bahiagrass
barley
Bermudagrass
carpetgrass
crabgrass
dallisgrass
downy bromegrass
fescue
guineagrass
Kentucky bluegrass
nutsedge
paragrass
quackgrass
ryegrass
sandbur
smooth bromegrass
torpedograss
vaseygrass
wheat
wild oat

Use Notes

1. Use higher rates within the specified rate range for plant sizes listed when vegetation cover is dense or when weeds are growing under stressed conditions including drought or when average temperatures are below 50°F.

The addition of 8.5 to 17 pounds of ammonium sulfate (spray grade) per 100 gallons of water (1 to 2% by weight) or 2 to 4 pounds of ammonium sulfate per acre may improve the level of weed control.

Use on Woody Species

When applied as directed, RM Glufosinate will provide control, partial control, or suppression of certain perennial woody weed species. Apply 64 to 192 fluid ounces (2 to 6 quarts) of product (0.5 lb. a.i. to 1.5 lb. a.i.) per acre. Use the higher listed rates per acre of this product when conditions are not optimum for spray penetration, including when vegetation growth is heavy or dense. Lower listed rates may be used when the target species is a conifer and when vegetation growth conditions allow for uniform spray coverage.

blackberry	*Rubus* spp.
deer brush	*Ceanothus integerrimus*
Douglas fir	*Pseudotsuga menziesii*
gallberry	*Ilex spp.*
hazel	*Corylus* spp.
honeysuckle	*Lonicera* spp.
huckleberry	*Gaylussacia* spp.
maple	*Acer* spp.
multiflora rose	*Rosa multiflora*
oak	*Quercus* spp.
pine	*Pinus* spp.
poison ivy	*Toxicodendron radicans*
poison oak	*Toxicodendron toxicarium*
roundleaf greenbriar	*Smilax rotundifolia*
salmonberry	*Rubus spectabilis*
sweet gum	*Liquidambar styraciflua*
sumac	*Rhus* spp.
thimbleberry	*Rubus parviflorus*
trumpetcreeper	*Campsis radicans*
vine maple	*Acer circinatum*
Western red cedar	*Thuja plicata*

WHERE TO APPLY

Trimming and Edging

RM Glufosinate may be used for trimming and edging landscape areas including: around individual trees and shrubs, landscape beds, foundations, fences, driveways, paths, and parking areas; also on golf courses along cart paths, around sign and light posts, and around sand traps. For control of weeds emerging from seed, use RM Glufosinate in a tank mix with preemergence herbicides. If spraying in areas adjacent to desirable plants, use a shield made of cardboard, plywood, or sheet metal while spraying to help prevent spray from contacting foliage of desirable plants. Refer to the How to Apply section of this labeling for appropriate application rates to control specific weeds.

Recreational and Public Areas

When applied as a spot or directed spray application, this product controls annual and perennial weeds listed on this label in areas including: airports, around commercial or industrial structures or outbuildings, bare ground, campgrounds, construction sites, storage and lumber yards, educational facilities, fence lines, firebreaks, gravel yards, ditch banks, dry ditches and canals, railroad rights-of-way, schools, parking lots, highways and roadsides (including aprons, medians, guardrails and rights of way), tank farms, trails, access roads, pumping stations, parks, sports areas, natural areas, wildlife habitat areas, and vacant lots. Refer to the How to Apply section of this labeling for appropriate application rates to control specific weeds.

Dormant Bermudagrass

RM Glufosinate may be used to control winter annual weeds in well-established ornamental dormant hybrid or common Bermudagrass. Apply only when the turf is fully dormant and prior to spring green-up or severe turfgrass injury or delayed green-up may occur. For best results, apply RM Glufosinate at a rate of 96 to 192 fluid ounces (3 to 6 quarts) of product (0.75 lb. a.i. to 1.5 lbs. a.i.) per acre after most weeds have germinated and are in an early growth stage. Refer to the Weeds Controlled by RM Glufosinate section of this label for selecting rates. Applications of RM Glufosinate may also be used to suppress or control undesirable biennial or perennial weeds. Avoid high volume and spot applications where spray volume exceeds 80 gallons per acre or injury or delayed green-up may occur.

Ornamentals and Christmas Trees

When applied as directed by this label, this product may be used for the control of undesirable vegetation in site preparation prior to planting, around and within shade and greenhouses, and as a directed spray around containers and field-grown established ornamentals and Christmas trees.

Directed spray application: Apply RM Glufosinate as a directed spray to control in-row weeds in field-grown woody plants. Refer to the How to Apply section of this labeling for appropriate application rate to control specific weeds. This product may also be used between and around containers and in site preparation for new planting.

Site preparation application: This product may be used for pre-plant site preparation for the control of annual and perennial weeds listed on this label, in ornamental and Christmas tree plantings. Ornamentals and Christmas trees may be planted into the treated area after the restricted entry interval (REI) of 12 hours has elapsed. Refer to the How to Apply section of this labeling for appropriate application rates to control specific weeds.

Greenhouse and shade house applications: RM Glufosinate may be used to control weeds in greenhouses and shadehouses. **Apply RM Glufosinate as a directed spray using low-pressure type nozzles. Avoid drift and direct contact with desirable vegetation.**

FARMSTEADS

When applied as directed, this product controls undesirable plant vegetation in non-crop areas around farmstead building foundations, shelter belts, along fences, and nonselective farmstead weed control. Refer to the How to Apply section of this labeling for appropriate application rates to control specific weeds.

USE PRECAUTIONS FOR NON-CROP USE

- This product is rainfast in a minimum of one-half hour and an average of 4 hours after application depending upon weed species, environmental conditions, and herbicide application rate.
- Plants may be safely planted into areas treated with this product after spray has dried.

USE RESTRICTIONS FOR NON-CROP USE

- **DO NOT** apply more than 192 fluid ounces (6 quarts) of product (1.5 lbs. a.i.) per acre per application for broadcast or boom applications.
- **DO NOT** apply more than 4 fl. oz. of product (0.03 lb. a.i.) per gallon of water per application for spot or directed applications.
- **DO NOT** apply more than 192 fluid ounces (6 quarts) of product (1.5 lbs. a.i.) per acre per year when applied as a combination of any type of application.
- **DO NOT** make more than 3 applications per year for broadcast or boom applications and no more than 2 applications per year on Dormant Bermudagrass when using reduced application rates.
- For spot or directed applications, reapply as needed however **DO NOT** apply more than 192 fluid ounces (6 quarts) of product (1.5 lbs. a.i.) per acre per year.
- **DO NOT** make more than 48 spot or directed applications per year.
- Applications must be made at least 5 days apart in non-crop areas.
- **DO NOT** apply beyond runoff.
- **DO NOT** apply this product through any type of irrigation system**.**
- **DO NOT** apply directly to or allow drift to contact desirable green tissue or green, thin, or uncalloused bark of desirable vegetation.
- **DO NOT** allow animals intended for slaughter to graze on treated vegetation.
- **DO NOT** apply this product as an over-the-top broadcast spray in ornamentals and shade or Christmas trees.
- For application in greenhouse and shade house applications, air circulation fans must be turned off during application.
- **DO NOT** use in greenhouses or shade houses containing edible crops.

STORAGE AND DISPOSAL

Do not contaminate water, food, or feed by storage or disposal.

PESTICIDE STORAGE: Store product in original container only. Store in a cool, dry place.

PESTICIDE DISPOSAL: Wastes resulting from the use of this product may be disposed of on-site or at an approved waste disposal facility.

CONTAINER HANDLING:

[Nonrefillable Container (five gallons or less): Nonrefillable container. Do not reuse or refill this container. Clean container promptly after emptying. Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank and drain for 10 seconds after the flow begins to drip. Fill the container 1/4 full with water and recap. Shake for 10 seconds. Pour rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Drain for 10 seconds after the flow begins to drip. Repeat this procedure two more times. Then offer for recycling if available or reconditioning if appropriate or puncture and dispose of in a sanitary landfill or by incineration.]

[Nonrefillable Container (larger than 5 gallons): Nonrefillable container. Do not reuse or refill this container. Triple rinse or pressure rinse container (or equivalent) promptly after emptying. Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank. Fill the container 1/4 full with water. Replace and tighten closures. Tip container on its side and roll it back and forth, ensuring at least one complete revolution, for 30 seconds. Stand the container on its end and tip it back and forth several times. Turn the container over onto its other end and tip it back and forth several times. Empty the rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Repeat this procedure two more times. Then

offer for recycling if available or reconditioning if appropriate or puncture and dispose of in a sanitary landfill or by incineration.]

CONDITION OF SALE AND LIMITATION OF WARRANTY AND LIABILITY

NOTICE: Read the entire Directions for Use and Conditions of Sale and Limitation of Warranty and Liability before buying or using this product. If the terms are not acceptable, return the product at once, unopened, and the purchase price will be refunded.

The Directions for Use of this product must be followed carefully. It is impossible to eliminate all risks inherently associated with the use of this product. Ineffectiveness or other unintended consequences may result because of such factors as manner of use or application, weather, presence of other materials or other influencing factors in the use of the product, which are beyond the control of Ragan and Massey, Inc. or Seller. To the extent consistent with applicable law, all such risks shall be assumed by Buyer and User, and Buyer and User agree to hold Ragan and Massey, Inc. and Seller harmless for any claims relating to such factors.

Ragan and Massey, Inc. warrants that this product conforms to the chemical description on the label and is reasonably fit for the purposes stated in the Directions for Use, subject to the inherent risks referred to above, when used in accordance with directions under normal use conditions. This warranty does not extend to the use of this product contrary to label instructions, or under abnormal conditions or under conditions not reasonably foreseeable to or beyond the control of Seller or Ragan and Massey, Inc., and Buyer and User assume the risk of any such use. TO THE EXTENT CONSISTENT WITH APPLICABLE LAW, RAGAN AND MASSEY, INC. MAKES NO WARRANTIES OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE NOR ANY OTHER EXPRESS OR IMPLIED WARRANTY EXCEPT AS STATED ABOVE.

To the extent consistent with applicable law, neither Ragan and Massey, Inc. nor Seller shall be liable for any incidental, consequential or special damages resulting from the use or handling of this product. **TO THE EXTENT CONSISTENT WITH APPLICABLE LAW, THE EXCLUSIVE REMEDY OF THE USER OR BUYER, AND THE EXCLUSIVE LIABILITY OF RAGAN AND MASSEY, INC. AND SELLER FOR ANY AND ALL CLAIMS, LOSSES, INJURIES OR DAMAGES (INCLUDING CLAIMS BASED ON BREACH OF WARRANTY, CONTRACT, NEGLIGENCE, TORT, STRICT LIABILITY OR OTHERWISE) RESULTING FROM THE USE OR HANDLING OF THIS PRODUCT, SHALL BE THE RETURN OF THE PURCHASE PRICE OF THE PRODUCT OR, AT THE ELECTION OF RAGAN AND MASSEY, INC. OR SELLER, THE REPLACEMENT OF THE PRODUCT.**

Ragan and Massey, Inc. and Seller offer this product, and Buyer and User accept it, subject to the foregoing Conditions of Sale and Limitation of Warranty and Liability, which may not be modified except by written agreement signed by a duly authorized representative of Ragan and Massey, Inc.

[EPA approval date]

{[LANGUAGE ON LABEL AFFIXED TO CONTAINER]}

RM GLUFOSINATE

[Alternate Brand Names: Compare-N-Save® Weed & Grass Killer with Glufosinate; FarmWorks® Weed & Grass Killer with Glufosinate; Farm General™ Weed & Grass Killer with Glufosinate]

GLUFOSINATE	GROUP	10	HERBICIDE

ACTIVE INGREDIENT:
Glufosinate ammonium..... 11.33%
OTHER INGREDIENTS: 88.67%
TOTAL:..... 100.00%
Equivalent to 1 lb. of active ingredient per U.S. gallon.

KEEP OUT OF REACH OF CHILDREN

WARNING-AVISO

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand the label, find someone to explain it to you in detail.)

FIRST AID	
If swallowed:	• Call a poison control center or doctor immediately for treatment advice. • Have person sip a glass of water if able to swallow. • Do not induce vomiting unless told to do so by a poison control center or doctor. • Do not give anything by mouth to an unconscious person.
If in eyes:	• Hold eye open and rinse slowly and gently with water for 15-20 minutes. • Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. • Call a poison control center or doctor for treatment advice.
If on skin or clothing:	• Take off contaminated clothing. • Rinse skin immediately with plenty of water for 15-20 minutes. • Call a poison control center or doctor for treatment advice.
If inhaled:	• Move person to fresh air. • If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably by mouth-to-mouth if possible. • Call a poison control center or doctor for treatment advice.
HOT LINE NUMBER	
Have the product container or label with you when calling a poison control center or doctor, or going for treatment. For emergency information concerning this product call your poison control center at 1-800-222-1222.	
NOTE TO PHYSICIAN: If this product is ingested, endotracheal intubation and gastric lavage should be performed as soon as possible, followed by charcoal and sodium sulfate administration.	

PRECAUTIONARY STATEMENTS
HAZARDS TO HUMANS AND DOMESTIC ANIMALS
WARNING

Causes substantial but temporary eye injury. Harmful if swallowed, inhaled, or absorbed through skin. Avoid contact with skin, eyes, or clothing. Avoid breathing vapor or spray mist. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, using tobacco or using the toilet. Remove and wash contaminated clothing before reuse.

ENVIRONMENTAL HAZARDS

DO NOT apply directly to water, or to areas where surface water is present, or to intertidal areas below the mean high water mark. **DO NOT** clean equipment or dispose of equipment washwaters in a manner that will contaminate water resources or arable land. Glufosinate-ammonium and its degradates have those properties normally associated with pesticides that have been detected in groundwater. Use of this product in areas with coarse soils and high water tables may result in groundwater contamination.

STORAGE AND DISPOSAL

Do not contaminate water, food, or feed by storage or disposal.

PESTICIDE STORAGE: Store product in original container only. Store in a cool, dry place.

PESTICIDE DISPOSAL: Wastes resulting from the use of this product may be disposed of on-site or at an approved waste disposal facility.

CONTAINER HANDLING:
[Nonrefillable Container (five gallons or less): Nonrefillable container. Do not reuse or refill this container. Clean container promptly after emptying. Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank and drain for 10 seconds after the flow begins to drip. Fill the container 1/4 full with water and recap. Shake for 10 seconds. Pour rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Drain for 10 seconds after the flow begins to drip. Repeat this procedure two more times. Then offer for recycling if available or reconditioning if appropriate or puncture and dispose of in a sanitary landfill or by incineration.]

[Nonrefillable Container (larger than 5 gallons): Nonrefillable container. Do not reuse or refill this container. Triple rinse or pressure rinse container (or equivalent) promptly after emptying. Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank. Fill the container 1/4 full with water. Replace and tighten closures. Tip container on its side and roll it back and forth, ensuring at least one complete revolution, for 30 seconds. Stand the container on its end and tip it back and forth several times. Turn the container over onto its other end and tip it back and forth several times. Empty the rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Repeat this procedure two more times. Then offer for recycling if available or reconditioning if appropriate or puncture and dispose of in a sanitary landfill or by incineration.]

[See] [inside] [attached] [label] [booklet] [for] [First Aid][,] [additional] [Precautionary Statements][,] [and] [Directions for Use] [including] [and] [Storage and Disposal] [instructions].

EPA Reg. No. 84009-xx
EPA Est. No.

Manufactured For:
Ragan & Massey, Inc.
101 Ponchatoula Parkway
Ponchatoula, LA 70454

Net Contents:

EXHIBIT E

US Environmental Protection Agency
Office of Pesticide Programs

Occupational Pesticide Handler Unit Exposure Surrogate Reference Table

June 2018

USEPA / Office of Pesticide Programs / Health Effects Division Occupational Pesticide Handler Unit Exposure Surrogate Reference Table					
Exposure Scenario (Activity, Equipment, Formulation, Site, etc.)[1]	**Exposure Route**	**Personal Protective Equipment (PPE) Level[2]**	**Data Source[3,4,5]**	**Statistic**	**Unit Exposure (µg/lb ai)**
Mixing / Loading Dry Flowable	Dermal	Single layer, no gloves (A)	AHETF (MEA)	Mean	227
		Single layer, gloves	AHETF (MEA)	Mean	51.6
		Double layer, gloves (B)	AHETF (MEA)	Mean	41.2
		Engineering control (water-soluble packaging)	AHETF (MEA)	Mean	12.5
	Inhalation	No Respirator	AHETF	Mean	8.96
		PF10 (C)	AHETF	Mean	0.896
		PF50 (D)	AHETF	Mean	0.179
		Engineering control (water-soluble packaging)	AHETF	Mean	2.6
Mixing / Loading Granules	Dermal	Single layer, no gloves (A)	AHETF (MEA)	Mean	23.6
		Single layer, gloves	AHETF (MEA)	Mean	8.12
		Double layer, gloves (B)	AHETF (MEA)	Mean	5.80
		Engineering control (closed loading system)	PHED	"Best fit"	8.6
	Inhalation	No Respirator	AHETF	Mean	0.825
		PF10 (C)	AHETF	Mean	0.083
		PF50 (D)	AHETF	Mean	0.017
		Engineering control (closed loading system)	PHED	"Best fit"	0.083
Mixing / Loading Liquids	Dermal	Single layer, no gloves (A)	AHETF (MEA)	Mean	220
		Single layer, gloves	AHETF (MEA)	Mean	37.6
		Double layer, gloves (B)	AHETF (MEA)	Mean	29.1
		Engineering control (closed loading system)	PHED	"Best fit"	8.6
	Inhalation	No Respirator	AHETF	Mean	0.219
		PF10 (C)	AHETF	Mean	0.022
		PF50 (D)	AHETF	Mean	0.0044
		Engineering control (closed loading system)	PHED	"Best fit"	0.083
Mixing / Loading Microencapsulates	Dermal	Single layer, no gloves (A)	AHETF (MEA)	Mean	220
		Single layer, gloves	AHETF (MEA)	Mean	37.6
		Double layer, gloves (B)	AHETF (MEA)	Mean	29.1
		Engineering control (closed loading system)	PHED	"Best fit"	8.6

USEPA / Office of Pesticide Programs / Health Effects Division Occupational Pesticide Handler Unit Exposure Surrogate Reference Table						
Exposure Scenario (Activity, Equipment, Formulation, Site, etc.)[1]		**Exposure Route**	**Personal Protective Equipment (PPE) Level[2]**	**Data Source[3,4,5]**	**Statistic**	**Unit Exposure (µg/lb ai)**
		Inhalation	No Respirator	AHETF	Mean	0.219
			PF10 (C)	AHETF	Mean	0.022
			PF50 (D)	AHETF	Mean	0.0044
			Engineering control (closed loading system)	PHED	"Best fit"	0.083
Mixing / Loading Wettable Powders		Dermal	Single layer, no gloves (A)	AHETF	Mean	77.7
			Single layer, gloves	AHETF	Mean	57.5
			Double layer, gloves (B)	AHETF	Mean	32.8
			Engineering control (water-soluble packaging)	AHETF (MEA)	Mean	12.5
		Inhalation	No Respirator	AHETF	Mean	2.75
			PF10 (C)	AHETF	Mean	0.275
			PF50 (D)	AHETF	Mean	0.055
			Engineering control (water-soluble packaging)	AHETF	Mean	2.6
Applicator, Aerial, Fixed-Wing	Liquids	Dermal	Engineering control (Enclosed cockpit)	AHETF (MEA)	Mean	2.08
		Inhalation	Engineering control (Enclosed cockpit)	AHETF (MEA)	Mean	0.0049
	Granules	Dermal	Engineering control (Enclosed cockpit)	PHED	"Best fit"	1.7
		Inhalation	Engineering control (Enclosed cockpit)	PHED	"Best fit"	1.3
Applicator, Aerosol Can	All sites (except animal treatments)	Dermal	Single layer, no gloves	PHED	"Best fit"	190000
			Single layer, gloves	PHED	"Best fit"	81000
			Double layer, gloves (B)	PHED	"Best fit"	64000
		Inhalation	No Respirator	PHED	"Best fit"	1300
			PF10 (C)	PHED	"Best fit"	130
			PF50 (D)	PHED	"Best fit"	26
	Animal (pet and livestock) treatments	Dermal	Single layer, no gloves	MRID 44433302	Mean	544000
			Single layer, gloves (E)	MRID 44433302	Mean	503000
			Double layer, gloves (B, E)	MRID 44433302	Mean	273000
		Inhalation	No Respirator	MRID 44433302	Mean	3270
			PF10 (C)	MRID 44433302	Mean	327
			PF50 (D)	MRID 44433302	Mean	66
Applicator, Open Cab Airblast		Dermal	Single layer, no gloves (A)	AHETF	Mean	1770

USEPA / Office of Pesticide Programs / Health Effects Division Occupational Pesticide Handler Unit Exposure Surrogate Reference Table					
Exposure Scenario (Activity, Equipment, Formulation, Site, etc.)[1]	**Exposure Route**	**Personal Protective Equipment (PPE) Level[2]**	**Data Source[3,4,5]**	**Statistic**	**Unit Exposure (µg/lb ai)**
		Single layer, gloves	AHETF	Mean	1590
		Single layer, gloves, chemical-resistant hat	AHETF (MEA)	Mean	215
		Double layer, gloves (B)	AHETF	Mean	1480
		Double layer, gloves, chemical-resistant hat (B)	AHETF (MEA)	Mean	141
		Engineering control (Enclosed Cab)	AHETF (MEA)	Mean	14.6
	Inhalation	No Respirator	AHETF	Mean	4.71
		PF10 (C)	AHETF	Mean	0.471
		PF50 (D)	AHETF	Mean	0.094
		Engineering control (Enclosed Cab)	AHETF	Mean	0.068
Applicator, Open Cab Groundboom	Dermal	Single layer, no gloves (A)	AHETF (MEA)	Mean	78.6
		Single layer, gloves	AHETF (MEA)	Mean	16.1
		Double layer, gloves (B)	AHETF (MEA)	Mean	12.6
		Engineering control (Enclosed Cab)	PHED	“Best fit”	5.1
	Inhalation	No Respirator	AHETF	Mean	0.34
		PF10 (C)	AHETF	Mean	0.034
		PF50 (D)	AHETF	Mean	0.0068
		Engineering control (Enclosed Cab)	PHED	“Best fit”	0.043
Applicator, Open Cab Solid Broadcast Spreader	Dermal	Single layer, no gloves	PHED	“Best fit”	9.9
		Single layer, gloves (E)	PHED	“Best fit”	7.2
		Double layer, gloves (B, E)	PHED	“Best fit”	4.2
		Engineering control (Enclosed Cab)	PHED	“Best fit”	2.0
	Inhalation	No Respirator	PHED	“Best fit”	1.2
		PF10 (C)	PHED	“Best fit”	0.12
		PF50 (D)	PHED	“Best fit”	0.024
		Engineering control (Enclosed Cab)	PHED	“Best fit”	0.22
Applicator, Granules by Hand	Dermal	Single layer, no gloves (A)	PHED	“Best fit”	104000
		Single layer, gloves	PHED	“Best fit”	71000
		Double layer, gloves (B)	PHED	“Best fit”	40280

USEPA / Office of Pesticide Programs / Health Effects Division Occupational Pesticide Handler Unit Exposure Surrogate Reference Table						
Exposure Scenario (Activity, Equipment, Formulation, Site, etc.)[1]		**Exposure Route**	**Personal Protective Equipment (PPE) Level[2]**	**Data Source[3,4,5]**	**Statistic**	**Unit Exposure (µg/lb ai)**
Applicator, Brush/roller		Inhalation	No Respirator	PHED	"Best fit"	470
			PF10 (C)	PHED	"Best fit"	47
			PF50 (D)	PHED	"Best fit"	9.4
		Dermal	Single layer, no gloves	PHED	"Best fit"	180000
			Single layer, gloves (E)	PHED	"Best fit"	24000
			Double layer, gloves (B, E)	PHED	"Best fit"	22000
		Inhalation	No Respirator	PHED	"Best fit"	280
			PF10 (C)	PHED	"Best fit"	28
			PF50 (D)	PHED	"Best fit"	5.6
Applicator, Airless Sprayer		Dermal	Single layer, no gloves	PHED	Mean	42600
				MRID 43600102		
			Single layer, gloves (E)	PHED	Mean	11700
				MRID 43600102		
			Double layer, gloves (B, E)	PHED	Mean	10600
				MRID 43600102		
		Inhalation	No Respirator	PHED	Mean	560
				MRID 43600102		
			PF10 (C)	PHED	Mean	56
				MRID 43600102		
			PF10 (C)	PHED	Mean	11.2
				MRID 43600102		
Flagger	Liquids	Dermal	Single layer, no gloves	PHED	"Best fit"	11
			Single layer, gloves	PHED	"Best fit"	12
			Double layer, gloves (B)	PHED	"Best fit"	10.6
		Inhalation	No Respirator	PHED	"Best fit"	0.35
			PF10 (C)	PHED	"Best fit"	0.035
			PF50 (D)	PHED	"Best fit"	0.007
	Granules	Dermal	Single layer, no gloves (F)	PHED	"Best fit"	2.75
			Single layer, gloves (E, F)	PHED	"Best fit"	2.73
			Double layer, gloves (E, G)	PHED	"Best fit"	1.59
		Inhalation	No Respirator	PHED	"Best fit"	0.15
			PF10 (C)	PHED	"Best fit"	0.015
			PF50 (D)	PHED	"Best fit"	0.003
Loader / Applicator, Belly Grinder		Dermal	Single layer, no gloves	PHED	"Best fit"	10000
			Single layer, gloves	PHED	"Best fit"	9300
			Double layer, gloves (B)	PHED	"Best fit"	5700

USEPA / Office of Pesticide Programs / Health Effects Division Occupational Pesticide Handler Unit Exposure Surrogate Reference Table							
Exposure Scenario (Activity, Equipment, Formulation, Site, etc.)[1]			**Exposure Route**	**Personal Protective Equipment (PPE) Level[2]**	**Data Source[3,4,5]**	**Statistic**	**Unit Exposure (µg/lb ai)**
			Inhalation	No Respirator	PHED	"Best fit"	62
				PF10 (C)	PHED	"Best fit"	6.2
				PF50 (D)	PHED	"Best fit"	1.24
Loader / Applicator, "Push-type" Rotary Spreader			Dermal	Single layer, no gloves	ORETF	Mean	440
				Single layer, gloves	ORETF	Mean	240
				Double layer, gloves (B)	ORETF	Mean	130
			Inhalation	No Respirator	ORETF	Mean	10
				PF10 (C)	ORETF	Mean	1.0
				PF50 (D)	ORETF	Mean	0.2
Mixer / Loader / Applicator, Manually-pressurized Handwand		Greenhouses, Wildlife management, Nurseries, Landscaping, Industrial/Commercial areas, Poultry/livestock houses, Animal treatments, Outdoor residential areas, Interior landscaping, Aquatic areas, Exterior building components, Mushroom houses, Christmas Tree Farms	Dermal	Single layer, no gloves	PHED	"Best fit"	100000
				Single layer, gloves	PHED	"Best fit"	430
				Double layer, gloves (B)	PHED	"Best fit"	365
			Inhalation	No Respirator	PHED	"Best fit"	30
				PF10 (C)	PHED	"Best fit"	3.0
				PF50 (D)	PHED	"Best fit"	0.6
		Food handling establishments, Warehouses, Structural treatments, Residential Living Spaces, Childcare centers/schools	Dermal	Single layer, no gloves (A)	PHED	"Best fit"	29000
				Single layer, gloves	PHED	"Best fit"	8600
				Double layer, gloves (B)	PHED	"Best fit"	6200
			Inhalation	No Respirator	PHED	"Best fit"	1100
				PF10 (C)	PHED	"Best fit"	110
				PF50 (D)	PHED	"Best fit"	22
Mixer / Loader / Applicator, Backpack Sprayer	General Broadcast/Foliar Applications	Poultry/Livestock houses, Industrial/Commercial areas, Livestock treatments, Structural treatments	Dermal	Single layer, no gloves (A)	PHED	"Best fit"	2510
				Single layer, gloves	PHED	"Best fit"	2500
				Double layer, gloves (B)	PHED	"Best fit"	1600
			Inhalation	No Respirator	PHED	"Best fit"	30
				PF10 (C)	PHED	"Best fit"	3.0
				PF50 (D)	PHED	"Best fit"	0.6
		Greenhouses	Dermal	Single layer, no gloves (A)	AHETF	Mean	13200
				Single layer, gloves	AHETF	Mean	11200
				Double layer, gloves (B)	AHETF	Mean	6230

USEPA / Office of Pesticide Programs / Health Effects Division Occupational Pesticide Handler Unit Exposure Surrogate Reference Table							
Exposure Scenario (Activity, Equipment, Formulation, Site, etc.)[1]			**Exposure Route**	**Personal Protective Equipment (PPE) Level[2]**	**Data Source[3,4,5]**	**Statistic**	**Unit Exposure (µg/lb ai)**
			Inhalation	No Respirator	AHETF	Mean	140
				PF10 (C)	AHETF	Mean	14
				PF50 (D)	AHETF	Mean	2.8
		Nurseries, Christmas Tree Farms, Wildlife management, Rights-of-way, Forestry, Landscaping (turf/plants/bushes/trees),	Dermal	Single layer, no gloves (A)	AHETF (MEA, *f*RA)	Mean	58400
				Single layer, gloves	AHETF (MEA, *f*RA)	Mean	30500
				Double layer, gloves (B)	AHETF (MEA, *f*RA)	Mean	16900
			Inhalation	No Respirator	AHETF	Mean	69.1
				PF10 (C)	AHETF	Mean	6.91
				PF50 (D)	AHETF	Mean	1.38
		Foundation/perimeter treatments, Aquatic areas[4]	Dermal	Single layer, no gloves (A)	MRID 44339801	Mean	8260
				Single layer, gloves	MRID 44339801	Mean	8260
				Double layer, gloves (B)	MRID 44339801	Mean	4120
			Inhalation	No Respirator	MRID 44339801	Mean	2.58
				PF10 (C)	MRID 44339801	Mean	0.258
				PF50 (D)	MRID 44339801	Mean	0.052
	Ground/Soil-directed (e.g., drench treatments, herbicides in orchards, vineyards, and tree farms)[5]		Dermal	Single layer, no gloves (A)	MRID 44339801	Mean	8260
				Single layer, gloves	MRID 44339801	Mean	8260
				Double layer, gloves (B)	MRID 44339801	Mean	4120
			Inhalation	No Respirator	MRID 44339801	Mean	2.58
				PF10 (C)	MRID 44339801	Mean	0.258
				PF50 (D)	MRID 44339801	Mean	0.052
	Granule formulation applications		Dermal	Single layer, no gloves (A)	MRID 45167201	Mean	155
				Single layer, gloves	MRID 45167201	Mean	144
				Double layer, gloves (B)	MRID 45167201	Mean	72.6
			Inhalation	No Respirator	MRID 45250702	Mean	23.8
					MRID 45167201		
				PF10 (C)	MRID 45250702	Mean	2.38
					MRID 45167201		
				PF50 (D)	MRID 45250702	Mean	0.476
					MRID 45167201		
Mixer / Loader / Applicator, Mechanically-pressurized Handgun Sprayer	Orchards, Vineyards, Specialty Agricultural Crops, Rights-of-way, Nurseries,	General Broadcast/Foliar Applications	Dermal	Single layer, no gloves (A)	AHETF (MEA)	Mean	6050
				Single layer, gloves	AHETF (MEA)	Mean	2050
				Double layer, gloves (B)	AHETF (MEA)	Mean	1360
			Inhalation	No Respirator	AHETF	Mean	8.68
				PF10 (C)	AHETF	Mean	0.868
				PF50 (D)	AHETF	Mean	0.174

USEPA / Office of Pesticide Programs / Health Effects Division Occupational Pesticide Handler Unit Exposure Surrogate Reference Table								
Exposure Scenario (Activity, Equipment, Formulation, Site, etc.)[1]				**Exposure Route**	**Personal Protective Equipment (PPE) Level[2]**	**Data Source[3,4,5]**	**Statistic**	**Unit Exposure (µg/lb ai)**
	Landscaping (non-turf), Industrial/Commercial areas, Aquatic areas, Wildlife management, Christmas Tree farms	Drench/Soil-directed Applications	All formulations, except wettable powders	Dermal	Single layer, no gloves (A)	AHETF (MEA)	Mean	6050
					Single layer, gloves	AHETF (MEA)	Mean	2050
					Double layer, gloves (B)	AHETF (MEA)	Mean	1360
				Inhalation	No Respirator	AHETF	Mean	8.68
					PF10 (C)	AHETF	Mean	0.868
					PF50 (D)	AHETF	Mean	0.174
			Wettable Powders	Dermal	Single layer, no gloves (A)	MRID 45773201	Mean	4310
					Single layer, gloves	MRID 45773201	Mean	4310
					Double layer, gloves (B)	MRID 45773201	Mean	2160
				Inhalation	No Respirator	MRID 45773201	Mean	3931
					PF10 (C)	MRID 45773201	Mean	393
					PF50 (D)	MRID 45773201	Mean	78.6
	Structural treatments, Warehouses, Poultry/livestock houses, Livestock treatments			Dermal	Single layer, no gloves	PHED	"Best fit"	1800
					Single layer, gloves	PHED	"Best fit"	640
					Double layer, gloves (B)	PHED	"Best fit"	365
				Inhalation	No Respirator	PHED	"Best fit"	79
					PF10 (C)	PHED	"Best fit"	7.9
					PF50 (D)	PHED	"Best fit"	1.58
	Greenhouses, Mushroom houses	General Broadcast/Foliar Applications		Dermal	Single layer, no gloves (A)	PHED	"Best fit"	3500
					Single layer, gloves	PHED	"Best fit"	2500
					Double layer, gloves (B)	PHED	"Best fit"	1600
				Inhalation	No Respirator	PHED	"Best fit"	120
					PF10 (C)	PHED	"Best fit"	12
					PF50 (D)	PHED	"Best fit"	2.4
		Drench/Soil-directed Applications	All formulations, except wettable powders	Dermal	Single layer, no gloves (A)	PHED	"Best fit"	3500
					Single layer, gloves	PHED	"Best fit"	2500
					Double layer, gloves (B)	PHED	"Best fit"	1600
				Inhalation	No Respirator	PHED	"Best fit"	120
					PF10 (C)	PHED	"Best fit"	12
					PF50 (D)	PHED	"Best fit"	2.4
			Wettable Powders	Dermal	Single layer, no gloves (A)	MRID 45773201	Mean	4310
					Single layer, gloves	MRID 45773201	Mean	4310
					Double layer, gloves (B)	MRID 45773201	Mean	2160
				Inhalation	No Respirator	MRID 45773201	Mean	3931
					PF10 (C)	MRID 45773201	Mean	393
					PF50 (D)	MRID 45773201	Mean	78.6

USEPA / Office of Pesticide Programs / Health Effects Division Occupational Pesticide Handler Unit Exposure Surrogate Reference Table							
Exposure Scenario (Activity, Equipment, Formulation, Site, etc.)[1]			**Exposure Route**	**Personal Protective Equipment (PPE) Level[2]**	**Data Source[3,4,5]**	**Statistic**	**Unit Exposure (µg/lb ai)**
	Turf (lawns, fields, golf courses)	Liquids	Dermal	Single layer, no gloves (A)	ORETF	Mean	1140
				Single layer, gloves	ORETF	Mean	880
				Double layer, gloves (B)	ORETF	Mean	450
			Inhalation	No Respirator	ORETF	Mean	1.9
				PF10 (C)	ORETF	Mean	0.19
				PF50 (D)	ORETF	Mean	0.038
		Water-dispersible Granules	Dermal	Single layer, no gloves (A)	ORETF	Mean	1960
				Single layer, gloves	ORETF	Mean	1400
				Double layer, gloves (B)	ORETF	Mean	740
			Inhalation	No Respirator	ORETF	Mean	42
				PF10 (C)	ORETF	Mean	4.2
				PF50 (D)	ORETF	Mean	0.84
		Wettable Powders	Dermal	Single layer, no gloves (A)	ORETF	Mean	1650
				Single layer, gloves	ORETF	Mean	1210
				Double layer, gloves (B)	ORETF	Mean	630
			Inhalation	No Respirator	ORETF	Mean	250
				PF10 (C)	ORETF	Mean	25
				PF50 (D)	ORETF	Mean	5
		Water-soluble Packets	Dermal	Single layer, no gloves (A)	ORETF	Mean	1350
				Single layer, gloves	ORETF	Mean	855
				Double layer, gloves (B)	ORETF	Mean	458
			Inhalation	No Respirator	ORETF	Mean	18
				PF10 (C)	ORETF	Mean	1.8
				PF50 (D)	ORETF	Mean	0.36
Mixer / Loader / Applicator, Handheld/Portable Fogger/Mister			Dermal	No data available			
			Inhalation	No Respirator	MRID 49602401	Mean	8916
				PF10 (C)	MRID 49602401	Mean	892
				PF50 (D)	MRID 49602401	Mean	178
Mixer / Loader / Applicator, Stationary/Automatic Fogger/Mister (without re-entry restriction)			Dermal	No data available			
			Inhalation	No Respirator	MRID 49602401	Mean	8916
				PF10 (C)	MRID 49602401	Mean	892
				PF50 (D)	MRID 49602401	Mean	178
Applicator, Stationary/Automatic Fogger/Mister (with re-entry restriction)			Applicator not present, exposure assumed negligible.				
Applicator, Truck-mounted Fogger/Mister			Dermal	Single layer, no gloves (A)	AHETF	Mean	1770
				Single layer, gloves	AHETF	Mean	1590

USEPA / Office of Pesticide Programs / Health Effects Division Occupational Pesticide Handler Unit Exposure Surrogate Reference Table						
Exposure Scenario (Activity, Equipment, Formulation, Site, etc.)[1]		**Exposure Route**	**Personal Protective Equipment (PPE) Level[2]**	**Data Source[3,4,5]**	**Statistic**	**Unit Exposure (µg/lb ai)**
			Single layer, gloves, chemical-resistant hat	AHETF (MEA)	Mean	215
			Double layer, gloves (B)	AHETF	Mean	1480
			Double layer, gloves, chemical-resistant hat (B)	AHETF (MEA)	Mean	141
			Engineering control (Enclosed Cab)	AHETF (MEA)	Mean	14.6
		Inhalation	No Respirator	AHETF	Mean	4.71
			PF10 (C)	AHETF	Mean	0.471
			PF50 (D)	AHETF	Mean	0.094
			Engineering control (Enclosed Cab)	AHETF	Mean	0.068
Applicator, Termiticide Injection		Dermal	Single layer, no gloves (A)	PHED	"Best fit"	1300
			Single layer, gloves	PHED	"Best fit"	360
			Double layer, gloves (B)	PHED	"Best fit"	250
		Inhalation	No Respirator	PHED	"Best fit"	2.2
			PF10 (C)	PHED	"Best fit"	0.22
			PF50 (D)	PHED	"Best fit"	0.044
Pour in/on	Liquids	Dermal	Single layer, no gloves (A)	AHETF (MEA)	Mean	220
			Single layer, gloves	AHETF (MEA)	Mean	37.6
			Double layer, gloves (B)	AHETF (MEA)	Mean	29.1
		Inhalation	No Respirator	AHETF	Mean	0.219
			PF10 (C)	AHETF	Mean	0.022
			PF50 (D)	AHETF	Mean	0.0044
	Granules	Dermal	Single layer, no gloves (A)	AHETF (MEA)	Mean	23.6
			Single layer, gloves	AHETF (MEA)	Mean	8.12
			Double layer, gloves (B)	AHETF (MEA)	Mean	5.80
		Inhalation	No Respirator	AHETF	Mean	0.825
			PF10 (C)	AHETF	Mean	0.083
			PF50 (D)	AHETF	Mean	0.017
	Dusts	Dermal	Single layer, no gloves (A)	AHETF (MEA)	Mean	227
			Single layer, gloves	AHETF (MEA)	Mean	51.6
			Double layer, gloves (B)	AHETF (MEA)	Mean	41.2
			Engineering control (water-soluble packaging)	AHETF (MEA)	Mean	12.5
		Inhalation	No Respirator	AHETF	Mean	8.96

USEPA / Office of Pesticide Programs / Health Effects Division Occupational Pesticide Handler Unit Exposure Surrogate Reference Table							
Exposure Scenario (Activity, Equipment, Formulation, Site, etc.)[1]			**Exposure Route**	**Personal Protective Equipment (PPE) Level[2]**	**Data Source[3,4,5]**	**Statistic**	**Unit Exposure (µg/lb ai)**
				PF10 (C)	AHETF	Mean	0.896
				PF50 (D)	AHETF	Mean	0.179
				Engineering control (water-soluble packaging)	AHETF	Mean	2.6
Animal (pet and livestock) Treatments	Back rubber		Dermal	Single layer, no gloves (A)	AHETF (MEA)	Mean	220
				Single layer, gloves	AHETF (MEA)	Mean	37.6
				Double layer, gloves (B)	AHETF (MEA)	Mean	29.1
			Inhalation	No Respirator	AHETF	Mean	0.219
				PF10 (C)	AHETF	Mean	0.022
				PF50 (D)	AHETF	Mean	0.0044
	Collar		Dermal	Single layer, no gloves (A)	MRID 44433303	Mean	112000
				Single layer, gloves	MRID 44433303	Mean	67800
				Double layer, gloves (B)	MRID 44433303	Mean	42000
			Inhalation	No Respirator	Applicator inhalation exposure expected to be negligible.		
				PF10 (C)			
				PF50 (D)			
	Dip		Dermal	Single layer, no gloves (F)	MRID 45528801	Mean	54300
				Single layer, gloves (F, E)	MRID 45528801	Mean	53400
				Double layer, gloves (G, E)	MRID 45528801	Mean	25600
			Inhalation	No Respirator	MRID 45528801	Mean	26.6
				PF10 (C)	MRID 45528801	Mean	2.66
				PF50 (D)	MRID 45528801	Mean	0.532
	Dust bag		Dermal	Single layer, no gloves (A)	AHETF (MEA)	Mean	227
				Single layer, gloves	AHETF (MEA)	Mean	51.6
				Double layer, gloves (B)	AHETF (MEA)	Mean	41.2
			Inhalation	No Respirator	AHETF	Mean	8.96
				PF10 (C)	AHETF	Mean	0.896
				PF50 (D)	AHETF	Mean	0.179
	Ear tag		Applicator exposure expected to be negligible; chemical-resistant gloves recommended.				
	Feed-through	Liquids	Dermal	Single layer, no gloves (A)	AHETF (MEA)	Mean	220
				Single layer, gloves	AHETF (MEA)	Mean	37.6
				Double layer, gloves (B)	AHETF (MEA)	Mean	29.1
			Inhalation	No Respirator	AHETF	Mean	0.219
				PF10 (C)	AHETF	Mean	0.022
				PF50 (D)	AHETF	Mean	0.0044
		Dust	Dermal	Single layer, no gloves (A)	AHETF (MEA)	Mean	227

USEPA / Office of Pesticide Programs / Health Effects Division Occupational Pesticide Handler Unit Exposure Surrogate Reference Table							
Exposure Scenario (Activity, Equipment, Formulation, Site, etc.)[1]			**Exposure Route**	**Personal Protective Equipment (PPE) Level[2]**	**Data Source[3,4,5]**	**Statistic**	**Unit Exposure (µg/lb ai)**
				Single layer, gloves	AHETF (MEA)	Mean	51.6
				Double layer, gloves (B)	AHETF (MEA)	Mean	41.2
			Inhalation	No Respirator	AHETF	Mean	8.96
				PF10 (C)	AHETF	Mean	0.896
				PF50 (D)	AHETF	Mean	0.179
		Granules	Dermal	Single layer, no gloves (A)	AHETF (MEA)	Mean	23.6
				Single layer, gloves	AHETF (MEA)	Mean	8.12
				Double layer, gloves (B)	AHETF (MEA)	Mean	5.80
			Inhalation	No Respirator	AHETF	Mean	0.825
				PF10 (C)	AHETF	Mean	0.083
				PF50 (D)	AHETF	Mean	0.017
	Shampoo		Dermal	Single layer, no gloves (F)	MRID 44658401	Mean	2098000
				Single layer, gloves (E, F)	MRID 44658401	Mean	2052000
				Double layer, gloves (E, B)	MRID 44658401	Mean	1029000
			Inhalation	No Respirator	MRID 44658401	Mean	292
				PF10 (C)	MRID 44658401	Mean	29.2
				PF50 (D)	MRID 44658401	Mean	5.84
	Sponge		Dermal	Single layer, no gloves (F)	MRID 45528801	Mean	844000
				Single layer, gloves (F, E)	MRID 45528801	Mean	767000
				Double layer, gloves (G, E)	MRID 45528801	Mean	386000
			Inhalation	No Respirator	MRID 45528801	Mean	208
				PF10 (C)	MRID 45528801	Mean	20.8
				PF50 (D)	MRID 45528801	Mean	4.16
	Spot-on		Dermal	Single layer, no gloves (A)	MRID 44433303	Mean	112000
				Single layer, gloves	MRID 44433303	Mean	67800
				Double layer, gloves (B)	MRID 44433303	Mean	42000
			Inhalation	No Respirator	Applicator inhalation exposure expected to be negligible.		
				PF10 (C)			
				PF50 (D)			
Loader / applicator, Bulb duster			Dermal	Single layer, no gloves	ORETF	Mean	166000
				Single layer, gloves (E)	ORETF	Mean	24700
				Double layer, gloves (E, B)	ORETF	Mean	20600
			Inhalation	No Respirator	ORETF	Mean	1690
				PF10 (C)	ORETF	Mean	169
				PF50 (D)	ORETF	Mean	33.8
Applicator, Wipe/Towelette			Dermal	Single layer, no gloves	AEATFII	Mean	2380000

USEPA / Office of Pesticide Programs / Health Effects Division Occupational Pesticide Handler Unit Exposure Surrogate Reference Table						
Exposure Scenario (Activity, Equipment, Formulation, Site, etc.)[1]		**Exposure Route**	**Personal Protective Equipment (PPE) Level[2]**	**Data Source[3,4,5]**	**Statistic**	**Unit Exposure (µg/lb ai)**
			Single layer, gloves (E)	AEATFII	Mean	238000
			Double layer, gloves (E, B)	AEATFII	Mean	238000
		Inhalation	No Respirator	AEATFII	Mean	480
			PF10 (C)	AEATFII	Mean	48
			PF50 (D)	AEATFII	Mean	9.6
Loader / applicator, Cup		Dermal	Single layer, no gloves	MRID 45333401	Mean	112
			Single layer, gloves (E)	MRID 45333401	Mean	11.2
			Double layer, gloves (E)	MRID 45333401	Mean	11.2
		Inhalation	No Respirator	MRID 45333401	Mean	12.5
			PF10 (C)	MRID 45333401	Mean	1.25
			PF50 (D)	MRID 45333401	Mean	0.25
Loader / applicator, Spoon		Dermal	Single layer, no gloves (A, F)	MRID 45250702	Mean	4170
			Single layer, gloves (F)	MRID 45250702	Mean	3030
			Double layer, gloves (A, G)	MRID 45250702	Mean	1580
		Inhalation	No Respirator	MRID 45250702	Mean	121
			PF10 (C)	MRID 45250702	Mean	12.1
			PF50 (D)	MRID 45250702	Mean	2.42
Single-use Injection (gels/pastes)		Applicator exposure expected to be negligible.				
Loader / applicator, Plunger duster		Dermal	Single layer, no gloves	ORETF	Mean	166000
			Single layer, gloves (E)	ORETF	Mean	24700
			Double layer, gloves (E, B)	ORETF	Mean	20600
		Inhalation	No Respirator	ORETF	Mean	1690
			PF10 (C)	ORETF	Mean	169
			PF50 (D)	ORETF	Mean	33.8
Applicator, Total-release Fogger		Applicator exposure expected to be negligible.				
Applicator, Tree Injection		Applicator exposure expected to be negligible.				
Applicator, Trigger-spray Bottle	All application sites, except animals	Dermal	Single layer, no gloves (A)	ORETF	Mean	3660
			Single layer, gloves	ORETF	Mean	1800
			Double layer, gloves (B)	ORETF	Mean	1110
		Inhalation	No Respirator	ORETF	Mean	61.2
				MRID 41054701		
				MRID 44739301		
			PF10 (C)	ORETF	Mean	6.12
				MRID 41054701		
				MRID 44739301		
			PF50 (D)	ORETF	Mean	1.22

USEPA / Office of Pesticide Programs / Health Effects Division Occupational Pesticide Handler Unit Exposure Surrogate Reference Table						
Exposure Scenario (Activity, Equipment, Formulation, Site, etc.)[1]		**Exposure Route**	**Personal Protective Equipment (PPE) Level[2]**	**Data Source[3,4,5]**	**Statistic**	**Unit Exposure (µg/lb ai)**
				MRID 41054701		
				MRID 44739301		
	Animal treatments	Dermal	Single layer, no gloves (F)	MRID 44433302	Mean	544000
			Single layer, gloves (F, E)	MRID 44433302	Mean	503000
			Double layer, gloves (G, E)	MRID 44433302	Mean	273000
		Inhalation	No Respirator	MRID 44433302	Mean	3300
			PF10 (C)	MRID 44433302	Mean	330
			PF50 (D)	MRID 44433302	Mean	66
Applicator, Shaker can	Granules	Dermal	Single layer, no gloves	MRID 45333401	Mean	112
			Single layer, gloves (E)	MRID 45333401	Mean	11.2
			Double layer, gloves (E)	MRID 45333401	Mean	11.2
		Inhalation	No Respirator	MRID 45333401	Mean	12.5
			PF10 (C)	MRID 45333401	Mean	1.25
			PF50 (D)	MRID 45333401	Mean	0.25
	Dusts	Dermal	Single layer, no gloves	MRID 44439901	Mean	4042000
				MRID 45519601		
			Single layer, gloves	MRID 44439901	Mean	110000
				MRID 45519601		
			Double layer, gloves (B)	MRID 44439901	Mean	72600
				MRID 45519601		
		Inhalation	No Respirator	MRID 44439901	Mean	17500
				MRID 45519601		
			PF10 (C)	MRID 44439901	Mean	1750
				MRID 45519601		
			PF50 (D)	MRID 44439901	Mean	350
				MRID 45519601		
Trap/bait station	Re-fillable	Dermal	Single layer, no gloves (A)	PHED	"Best fit"	104000
			Single layer, gloves	PHED	"Best fit"	71000
			Double layer, gloves (B)	PHED	"Best fit"	40280
		Inhalation	No Respirator	PHED	"Best fit"	470
			PF10 (C)	PHED	"Best fit"	47
			PF50 (D)	PHED	"Best fit"	9.4
	Single-use	Applicator exposure expected to be negligible.				

[1] If the description of the scenario is silent on specific equipment, sites, formulations, etc., the data are applicable to all potential applications for that scenario.

[2] Single layer = long-sleeve shirt, long pants, shoes plus socks. Double layer = "coveralls" in addition to single layer.

USEPA / Office of Pesticide Programs / Health Effects Division Occupational Pesticide Handler Unit Exposure Surrogate Reference Table					
Exposure Scenario (Activity, Equipment, Formulation, Site, etc.)[1]	**Exposure Route**	**Personal Protective Equipment (PPE) Level[2]**	**Data Source[3,4,5]**	**Statistic**	**Unit Exposure (µg/lb ai)**
Exposure monitoring data representing all levels of PPE for all scenarios are unavailable. In order to represent different PPE levels, exposure values are calculated using assumptions for the protection afforded by additional layers of clothing, chemical-resistant gloves, or respirators. Exposure assessors should be mindful of the uncertainties that this convention introduces into the overall calculations. In all cases, estimates based on direct measurements representing the PPE-level specified are the most reliable. If a scenario uses PPE calculation assumptions, they are identified in the table with one or more of the following notations: (A) "No glove" hand exposure back-calculated from available "gloved hand" exposure data by multiplying by 10 (i.e., chemical-resistant gloves are assumed to reduce hand exposure by 90%). (B) "Double layer" body exposure calculated from available "single layer" body exposure data by dividing by 2 (i.e., an additional layer of clothing is assumed to reduce body exposure by 50%). (C) "PF10" respirator exposure calculated from available "no respirator" exposure data by dividing by 10 (i.e., a PF10 respirator is assumed to reduce inhalation exposure by 90%). (D) "PF50" respirator exposure calculated from available "no respirator" exposure data by dividing by 50 (i.e., a PF50 respirator is assumed to reduce inhalation exposure by 98%). (E) "Gloved" hand exposure calculated from available "no glove" hand exposure data by dividing by 10 (i.e., chemical-resistant gloves are assumed to reduce hand exposure by 90%). (F) "Single layer" body exposure calculated from available "total deposition" body exposure data by dividing by 2 (i.e., an additional layer of clothing is assumed to reduce body exposure by 50%). (G) "Double layer" body exposure calculated from available "total deposition" body exposure data by dividing by 4 (i.e., two layers of clothing are assumed to reduce body exposure by 75%). If a scenario does not have one of these notations, the data underlying the recommended values is a direct match for the indicated level of PPE. [3] PHED = Pesticide Handler Exposure Database; AHETF = Agricultural Handler Exposure Task Force; ORETF = Outdoor Residential Exposure Task Force; MRID = Master Record Identification (#). [4] Where applicable, the notation "MEA" is added to signify that the default values reflect an (upward) adjustment by the U.S. EPA for potential inefficiency of the hand wash and face/neck wipe exposure monitoring methods. MEA = Method Efficiency Adjustment. [5] Where applicable, the notation "*f*RA" is added to signify that the default value reflects an (upward) adjustment by the U.S. EPA to reflect that the underlying data did not meet benchmark accuracy objectives. *f*RA = fold Relative Accuracy. [6] Due to the effect that the back-calculation from "gloved hands" to represent "non-gloved hands" has on distributional variability and parametric estimates, no adjustment was made to hand measurements to represent unit exposures for "single layer, no gloves". That is, the unit exposure for "single layer, gloves" is also assigned to "single layer, no gloves".					

Attachment 1
Documentation of Revisions

Date	Documentation of Revisions

Apr2011	• Original version, modeled based on "PHED Surrogate Guide"
	• Reflects move from data from PHED to AHETF for following scenarios
	  ○ Open Cab Groundboom
	  ○ Open Mix/Load Liquids
	  ○ Open Mix/Load Dry Flowable
	• Published EPA webpage on occupational pesticide handler exposure, including link to reference table

May2011	• Replaced PHED values for "Closed Cab Airblast" with those from AHETF
Jun2011	• Replaced PHED values for "Open Cab Airblast" with those from AHETF • Corrected unit exposure for "Mixer / Loader / Applicator, Low-pressure Handwand, Wettable Powder, Double layer, gloves" from 620 µg/lb ai to 6200 µg/lb ai

Sep2011	• Reflects overhaul of exposure scenario assignment of available surrogate data
	  ○ New scenarios added (e.g., pet/animal treatments)
	  ○ Scenario subsets added (e.g., power handgun site subsets)
	  ○ Available individual proprietary studies assigned
	• Footnotes edited
	• Orientation changed to landscape to accommodate scenario additions

Mar2012	• Corrected "Dip" and "Sponge" inhalation unit exposures to reflect use of ½ LOD without correction for field fortification per standard policy • Corrected "Mixing / Loading Liquids" inhalation unit exposures to 2 significant figures • Removed PPE footnote notation "(H)" since that does not apply to any scenario • Corrected PPE notations for "Spoon" scenario to reflect exposure monitoring of "total deposition with chemical-resistant gloves" • For "Mechanically-pressurized Handgun Sprayer", added "Specialty Agricultural Crops" to a sub-set category • Added "Documentation of Revisions" as an attachment
Mar2013	• Aerial Applicator scenario: PHED replaced with data from the AHETF • Re-assigned MRID45773201 to drench/soil-directed applications of wettable powders only • Footnote (G) typographical correction: "100%" corrected to "75%" (unit exposures are unchanged)
Sept2015	• Additional livestock treatment scenarios incorporated (backpack and mechanically-pressurized handgun) • Wildlife management incorporated into mechanically-pressurized handgun scenario • Mushroom houses incorporated into mechanically-pressurized handgun scenario and manually-pressurized handwand scenario • Granule formulations added to "animal, feed-through" scenario • Characterized Animal treatments as "Pet" or "Livestock" • Incorporated new data from AHETF for backpack applicator and mechanically-pressurized handgun applicators in rights-of-ways and other similar use patterns. • Added tree injection applicator scenario.
Nov2016	• Incorporated new data from AHETF for mixing/loading wettable powders and mixing/loading water-soluble packets • Added clarifying footnotes to the "Data Source" • Added scenario for "Mixer/Loader/Applicator, Fogging Equipment (handheld, portable, stationary)" • Added scenario for "Applicator, Truck-mounted Fogger" • Added scenario for "Applicator, Stationary Fogger (with re-entry restriction)" • Added scenario for "Applicator, Wipe/Towelette"

	• Revised table formatting for "Applicator, Pour in/on" scenario
Jun2018	• Replaced data for Open Pour Loading Granules with new AHETF data. Scenarios effected: Loading Granules as well as Feed-through and Pour in/on • PF5 respirators revised to PF10, bringing EPA up to date with long-standing assumptions and practice by the Occupational Safety and Health Administration (OSHA) and the National Institutes for the Occupational Safety and Health (NIOSH). • PF50 respirators added as a potential PPE option. • Separated and edited the "Mixer/Loader/Applicator, Fogging Equipment (handheld, portable, stationary)" into "Mixer/Loader/Applicator, Handheld/Portable Fogger/Mister" and "Mixer/Loader/Applicator, Automatic/Stationary Fogger/Mister (without re-entry restriction)" • Edited scenario for "Applicator, Truck-mounted Fogger" to "Applicator, Truck-mounted Fogger/Mister" • Edited scenario for "Applicator, Stationary Fogger (with re-entry restriction)" to "Applicator, Stationary/Automatic Fogger/Mister (with re-entry restriction)" • For manually pressurized handwand, clarified Structural treatments by adding a scenario for Exterior building components and moving Structural treatments to a different surrogate dataset • Added scenarios for Microencapsulate formulations with liquid AHETF data as the surrogate dataset • Removed inapplicable engineering control scenarios from Pour in/on scenarios • Edited "Paintbrush/roller" to "Brush/roller" • Corrected inhalation unit exposures for Handgun/Turf/Water-soluble Packets. Previously mistakenly showed values for liquid formulations (i.e., copy/paste error). EPA calculations, however, used correct unit exposures.